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ORIGINAL COMMUNICATIONS.

*Objections to the Theories of Franklin, Dufay, or Ampere, with an effort to explain electrical phenomena by the statical or undulatory polarization of omnipresent, ethereal, or ethereo-ponderable matter.** By Robert Hare, M. D., Emeritus Professor of Chemistry in the University of Pennsylvania.

1. It appears, from the experiments of Wheatstone, that the discharge of a Leyden jar, by means of a copper wire, takes place within a time so small, that were the transfer of a fluid from the positive to the negative surface requisite for its accomplishment, a current having a velocity exceeding two hundred thousand miles in a second would be necessary.

2. The only causes for the velocity of an electric current, according to Franklin, are the repulsion between the particles of the electric fluid, of which it has been assumed to consist, and

* Read before the Academy of Natural Sciences, and although ordered to be published in the forthcoming volume, has been excluded by matter having priority of date. Hence, to avoid procrastination—with permission from the Academy—it has been communicated to the obliging Editor of this work.

This commnnication might have been offered to the Journal in which those affiliated with the University usually make their communications, were it not that my friend, the editor, to an inquiry replied, that "*nothing which is not directly applied to medicine*" would be published in that channel.

the attraction between those particles and other matter. These forces are alleged to concur in distributing the supposed fluid throughout space; whether otherwise void, or partially pre-occupied by conducting solids or fluids. Hence, when between two or more spaces, surfaces, or conducting masses, there is an unequal distribution of the electric fluid, the equilibrium is restored whenever a communication is opened, by means of a sufficiently conducting medium. Agreeably to this view of the subject, there seems to be a resemblance between the supposed effort of the electrical fluid to attain a state of equable diffusion, and that which would exist in the case of a gas confined in adjoining receivers, so as to be more dense within one than within the other; for, however the subtility of the supposed electric fluid may exceed that of any gas, there seems to be an analogy as respects the processes of diffusion which must prevail. But on the escape of any elastic fluid from a cavity, within which it may be condensed, evidently there must be a diminution of density, and of the consequent velocity of efflux, proportionally as the quantity left in the cavity diminishes, so that the latter portions would move with extreme slowness. Far from taking place in an analogous manner, electrical discharges are effected with an extreme suddenness, the whole of the redundancy being discharged at once in a mode more like the flight of a bullet, projected with infinite velocity, than that of a jet varying in celerity from a maximum to a minimum.

3. So far, in fact, is an electrical discharge from displaying the features which belong to the reaction of a condensed elastic fluid, that agreeably to the observations of Henry, the result is more like the vibrations of a spring, which, in striving to regain its normal position, goes beyond it. The first discharge between the surfaces of a Leyden jar is not productive of a perfect equilibrium. The wave-like transfer of different polarities goes beyond the point of reciprocal neutralization, producing a state, to a small extent, the opposite of that at first existing; and hence a refluent discharge ensues, opposite in direction to the primary one. But even this does not produce an equilibrium, so that a third effort is made. These alternate discharges were detected by means of the magnetism imparted to needles exposed, in helices, to the consequent current, more properly called polarizing undulations or waves.

4. Supposing one or more rows of electrical particles, forming such a filament of electricity as must occupy the space within a wire of great length, to be made the medium of discharge to a Leyden jar; agreeably to the hypothesis of one fluid, the electrical filament must be attracted at one end of the wire, and propelled at the other, as soon as its terminations are brought into

due communication with the coatings of the jar. Yet the influence of the oppositely charged surfaces of the jar cannot be conceived to extend to those portions of the electricity which are remote from the points of contact, until they be reached by a succession of vibrations. Hence it is inconceivable that every particle in the filament of electric matter can be made at the same time to move, so as to constitute a current having the necessary velocity and volume to transfer, instantaneously, the electricity requisite to constitute a charge. Even the transmission of the impulses, in such an infinitesimal of time, seems to be inconceivable.

5. In reply to these objections, it has been urged by the Franklinians, that a conductor being replete with electricity, as soon as this fluid should be moved at one end, it ought to move at the other. This might be true of an incompressible fluid, but could not hold good were it elastic. A bell wire moves at both ends when pulled only at one; but this would not ensue were a cord of gum elastic substituted for the wire.

6. But if the flow of one fluid, with the enormous velocity inferred, be difficult to conceive, still more must it be incomprehensible that two fluids can rush with similar celerity, from each surface of the jar, in opposite directions, through the narrow channel afforded by a wire; especially as they are alleged to exercise an intense affinity; so that it is only by a series of decompositions and recompositions that they can pass each other. That agreeably to the theory of Dufay, equivalent portions of the resinous and vitreous fluids must exchange places during an electrical discharge, will appear evident from the following considerations:

7. One surface being redundant with vitreous and deficient commensurately of resinous electricity, and the other redundant with the resinous and deficient of the vitreous fluid, it is inevitable that to restore the equilibrium, there must be a simultaneous transfer of each redundancy to the surface wherein there is a deficiency of it to be supplied. If after decomposing a large portion of the neutral compound, previously existing on the surfaces of the jar, and transferring the ingredients severally in opposite directions, so as to cause each to exist in excess upon the surface assigned to it, were the redundancies, thus originated, to be neutralized by meeting in the discharging rod, neither surface could recover its quota of the electrical ingredient of which it must have been deprived agreeably to the premises.

8. This calls to mind the fact, that no evidence has been adduced of the existence of any tertium quid, arising from the union of the supposed electricities founded on any property displayed by their resulting combination in the neutral state. It must, if it exists, constitute an anomalous matter, destitute of all properties, and of the

existence of which we have no evidence, besides that founded on the appearance and disappearance of its alleged ingredients.

9. But however plausibly the discharges consequent to making a conducting communication from one electrified mass or surface to another mass or surface in an opposite state, may be ascribed to accumulations either of one or of two fluids; neither, according to one theory nor the other, is it possible to account satisfactorily for the stationary magnetism with which steel may be endowed, nor the transitory magnetism, or dynamic power of induction, acquired by wires transmitting galvanic discharges.

10. For the most plausible effort which has been made for the purpose of reconciling the phenomena of electro-magnetism with the theory of two fluids, or with that of one fluid, so far as these theorie are convertible, we are indebted to Ampere.

11. According to the hypothesis advanced by this eminent philosopher, the difference between a magnetised and an electrified body, is not attributable to any diversity in the imponderable matter to which their properties are respectively due, but to a difference in the actual state or distribution of that matter. Statical polarity is the consequence of the unequal distribution of the two electric fluids whose existence he assumes; while magnetical polarity is the consequence merely of the motion of those fluids; which, in magnets, are supposed to gyrate in opposite directions about each particle of the mass.

These gyrations are conceived to take place only in planes at right angles to the axis of the magnet; so that, in a straight magnet, the planes of the orbits must be parallel to each other.*

12. The aggregate effect of all the minute vortices of the electrical fluids, in any one plane, bounded by the lateral surfaces of the magnet, is equivalent externally to one vortex, since, in either case, every electric particle on that surface will so move as to describe tangents to a circle drawn about the axis of the magnet. When the electrical vortices of the pole of one magnet, conflict in their direction with those of another, as when similar magnetic poles are approximated, repulsion ensues; but if the vortices are coincident in direction, as when dissimilar poles are near, attraction takes place. When a current through a galvanized wire concurs in direction with the magnetic vortices, as above described, attraction ensues; repulsion resulting when it does not so concur. Hence, the magnet, if moveable, will strive to assume a position, in which its electrical currents will not conflict with those of the wire on one side more than on the other: also, the wire, if moveable, will tend so to arrange itself as to produce the same result, which can arrive only when the needle is

* The words gyration, vortex and whirl, are considered as synonymous, and alternately used only to avoid monotony.

at right angles to the wire, and its sides consequently equi-distant therefrom.

13. Electric currents will produce magnetic vortices, and reciprocally, magnetic vortices will produce electric currents. Hence the magnetism imparted to iron by galvanized spirals, and the Faradian currents produced by magnetized iron within spirals not galvanized.

14. Ampere's theory has, in a high degree, the usual fault of substituting one mystery for another; but, on the other hand, it has, in an equally high extent, the only merit to which any theory can make an indisputable claim: I mean, that of associating facts so as to make them more easy to comprehend and to remember, enabling us, by analogy, to forsee results, and thus affording a clue in our investigations. Evidently, the author of this theory was guided by it, in his highly interesting and instructive contrivances; and Professor Henry ascribes his success in improving the electro-magnet, to the theoretic clue which he had received from Ampere.

15. Nevertheless, the postulates on which this Amperian hypothesis is founded, appear to me unreasonable. They require us to concede that about every atom of a permanent magnet a process is going on, analogous to that generally admitted to exist in a galvanic circuit, where two fluids pass each other in a common channel by a series of decompositions and recompositions. In the galvanic circuit this process is sustained by chemical reaction, but in magnets having no co-enduring reagency to sustain it, the heterogenous constituents of an imaginary electrical tertium quid, are presumed to be perpetually separating in order to recombine.

16. In cases of complex affinity, where four particles, A B C D are united into two compounds A B, C D, it is easy to conceive that, in obedience to a stronger affinity, A shall combine with B, and C with D: but, without any extraneous agency, wherefore, in any one compound, should a particle A quit one particle B, in order to unite with another particle of the same kind; or wherefore should any one, B, quit one A, in order to combine with another A.

17. That such a process should ensue by a species of catalytic agency exercised by a magnet or galvanized conductor, while in proximity, were difficult to understand; but to me it is utterly unintelligible that the transient influence of such a cause, should be productive of permanent gyrations.

18. Moreover, it is inconceivable that the particles of any matter should, as required by this hypothesis, *merely by being put into motion*, acquire a power of reciprocal repulsion, or attraction, of which it were otherwise destitute. The vortices being assumed to take place about each atom, cannot severally occupy an area of

greater diameter than can exist between the centres of any two atoms. Of course, the gyratory force exercised about the surface of a magnet by the aggregate movements of the vortices, cannot extend beyond the surface more than half the diameter of one of the minute areas of gyration alluded to. Wherefore, then, do these gyrations, when similar in direction, from their concurrence approach each other; when dissimilar in direction move asunder, even when situated comparatively at a great distance?

19. I should consider Ampere's theory as more reasonable, were it founded upon the existence of one fluid; since, in that case, vortices might be imagined without the necessity of supposing an endless and unaccountable separation and reunion of two sets of particles; not only devoid of any property capable of sustaining their alleged opposite gyrations, but actually endowed with an intense reciprocal attraction which must render such gyrations impossible.

But even if grounded on the idea of one fluid, this celebrated hypothesis does not seem to me to account for the phenomena which it was intended to explain. If distinct portions of any fluid do not attract or repel each other when at rest, wherefore should they either attract or repel each other when in motion. Evidently mere motion can generate neither attraction nor repulsion. Bodies subjected to a projectile force gravitate with the same intensity and descend in obedience to terrestrial attraction, through the same perpendicular distance, whether moving with the celerity of a cannon ball, or a planet, or undergoing no impulse excepting those arising from their own unresisted weights.

20. The objections which are thus shown to be applicable in the case of liquids, of which the neighbouring particles are destitute of the reaction requisite to produce the phenomena requiring explanation, must operate with still greater force where ethereal fluids are in question, of which the properties are positively irreconcileable with the phenomena. According both to Franklin and Dufay, bodies, when similarly electrified, should repel each other; yet in point of fact, collateral wires, when subjected to similar voltaic discharges, and of course similarly electrified, become reciprocally attractive, while such wires, when dissimilarly electrified by currents which are not analogous, become reciprocally repulsive.

21. Agreeably to Ampere, an iron bar, situated within a coil of wire subjected to a galvanic current, is magnetized, because the current, in the wire, is productive of an electrical whirlpool about every particle of the metal. When the iron is soft the magnetism, and of course the gyrations of which its magnetism consists by the premises, cease for the most part as soon as the circuit through the coil is broken; but when the iron is in the more rigid state of hardened steel, the gyrations continue for any length of time after the exciting cause has ceased.

22. This theory does not explain wherefore the hardening of the steel should cause the vortical motion to be more difficult to induce yet more lasting when its induction is effected. Evidently the metallic particles must take some part in the process; since it is dependent, for its existence and endurance, upon their nature and their state. Yet no function is assigned to these particles. In fact, it is inconceivable, either that they can participate in, or contribute to the supposed vortical motion.

23. The electrical fluid in an iron bar, cannot form a vortex about each particle, all the vortices turning in one direction, without a conflict between those which are contiguous. In order not to conflict with each other, the alternate vortices would have to turn in different directions, like interlocking cog-wheels in machinery. But in that case, if magnetism be due to currents, the magneto-inductive influence of one set would neutralize that of the other. Again, how can a current, excited by a battery in one circuitous conductor, cause, by dynamic induction, a current in the opposite direction, through another conductor parallel to the first, but insulated therefrom? How can a current of quantity in a ribbon coil, give rise to one of intensity in a helix of fine wire?

24. Having stated my objections to the electrical theories heretofore advanced, it may be proper that I should suggest any hypothetical views which may appear to me of a character to amend or to supersede those to which I have objected. But however I may have been emboldened to point out defects which have appeared to me to be inherent in the theories heretofore accredited, I am far from presuming to devise any substitute which will be unobjectionable. I am fully aware that there is an obscurity as respects the nature and mutual influence of chemical affinity, heat, light, electricity, magnetism and vitality, which science can only to a minute extent dispel.

25. The hypothesis which I now deem preferable is so much indebted to the researches and suggestions of Faraday and others, that, were it true, I could claim for myself but a small share of the merit of its origination.

26. That sagacious electrician employs the following language: "*In the long continued course of experimental inquiry, in which I have been engaged, this general result has pressed upon me constantly, namely, the necessity of admitting two forces or directions of force combined with the impossibility of separating these two forces or electricities from each other.*"—*Experimental Researches*, 1163.

27. Subsequently (1244) after citing another proof of the inseparability of the two electric forces, he alleges it *to be another argument in favour of the view that induction and its concomitant phenomena depend upon* a polarity of the particles of matter!

28. Graham, in his Elements, treating of electricity, alleges that

the "great discoveries of Faraday have completely altered the aspect of this department of science, and suggests that all electrical phenomena whatever involve the presence of matter."

29. Unless the distinguished author, from whom this quotation is made, intended to restrict the meaning of the word matter to ponderable matter, there was no novelty in the idea that electrical phenomena involve the presence of matter, since the hypotheses of Franklin and Dufay assume the existence of one or more imponderable material fluids. But, on the other hand, if the meaning of the word *matter* is only to comprise that which is ponderable, the allegation is inconsistent with the authority cited. According to the researches of Faraday, there is an enormous electrical power in metals, and according to his speculations, such powers must be considered as imponderable material principles, pervading the space within which they prevail, independently of any ponderable atom acting as a basis for material properties; the existence of such atoms being represented as questionable.

Grounds on which a Theory may be advanced.

30. The existence of two distinct electro-polar forces acting in opposite directions, and necessarily connate and co-existent, yet capable of reciprocal neutralization, agreeably to the authority of Faraday and others.

31. General polarity of matter in assuming the solid state, as displayed during crystallization and vegetation of salts; also as made evident by Faraday's late researches, and the experiments and observations of Hunt.

32. That four hundred and thirty atoms which form a cube of potassium in the metallic state, must occupy nearly six times as much space as the same number of similar atoms fill when existing in a cube of hydrated oxide of potassium of the same size; which, besides seven hundred metallic atoms, must hold seven hundred atoms of hydrogen and fourteen hundred of oxygen, in all two thousand eight hundred atoms; whence it follows there must, in the metallic cube, be *room* for six times as many atoms as it actually holds.*

33. With all due deference, I am of opinion that Faraday has not been consistent in assuming that, agreeably to the Newtonian idea of ponderable atoms, the space in potassium not replete with metal must be vacant; since, according to facts established by his researches, or resulting therefrom, an enormous quantity, both of the causes of heat and of electricity, exists in metals. Moreover, agreeably to his recent speculations, those causes must consist of material, independent, imponderable matter, occupying the whole of the space in which their efficacy is perceptible.*

* Silliman's Am. Jour. Sci., v. 48, p. 247. L. & E. Phil. Mag. and Jour., v. 27, p. 136, v. 25, p. 602.

34. To the evolution of the imponderable matter thus associated, the incandescence of a globule of potassium on contact with water, may be explained, since it is the consequence of the displacement of such matter by the oxygen and hydrogen, which, in replacing it, converts the metal into the hydrated oxide called caustic potash.

The existence both of the causes of electricity and heat in metals, is likewise confirmed by the fact, that the inductive influence of a magnet is sufficient to cause all the phenomena of heat, electrolysis and magnetism, as exemplified by the magneto-electric machine. The existence of the cause of heat in metals is also evident from the ignition of an iron rod when hammered, or the deflagration of wire by the discharge of a Leyden battery.

35. The superiority of metals as electrical conductors, may be the consequence of the pre-eminent abundance of imponderable matter entering into their composition, as alluded to in the case of potassium. (32.)

36. It having been shown that in electrical discharges there cannot reasonably be any transfer of matter, so as to justify the idea of their being the consequence either of one current or of two currents, the only alternative seems to be that the phenomena are due to a progressive affection of the conducting medium, analogous in its mode of propagation to waves, as in the case of liquids, or the aerial or ethereal undulations to which sound and light are ascribed. (1, 2, 3, &c. &c.)

37. The idea intended to be conveyed by the word wave, as applied in common to the undulatory affections above mentioned, and that which is conceived to be the cause of the phenomena usually ascribed to one or more electrical currents, requires only that there should be a state of matter, which, while it may be utterly different from either of those which constitute the waves of water, light or sound, may, nevertheless, like either, pass successively from one portion of a mass to another.

38. The affection thus designated may be reasonably distinguished from other waves, as a *wave of polarization*, since the wire acts, so long as subjected to the reiterated discharges of a voltaic series, as if it were converted into innumerable small magnets, situated like tangents to radii proceeding from its axis.

39. But if a polarizable medium be requisite to electrical discharges, as they pass through a space when devoid of *ponderable* matter, there must be some *imponderable* medium through which they can be effected. Hence we have reason to infer that there is an imponderable matter existing throughout

all space, as well as within conductors, which is more or less the medium of the opposite waves essential to electric discharges. Quoting his own language, Davy's experiments led him to consider "that space, (meaning void space,) where there is an appreciable quantity of this matter, (meaning ponderable matter,) is capable of exhibiting electrical phenomena:" also that such phenomena "are produced by a highly subtile fluid or fluids." Moreover, that "it may be assumed, as in the hypothesis of Hooke, Euler, and Huygens, that an ethereal matter susceptible of electrical affections fills all space.*

40. Agreeably to the suggestions above made, all ponderable matter which is liable to be electrified *internally* by electrical discharges, may be considered as consisting of atoms composed of imponderable ethereo-electric particles in a state of combination with ponderable particles, analogous to that which has been supposed to exist between such particles and caloric when causing expansion, liquidity or the aeriform state. Atoms so constituted of ethereal and ponderable particles, may be designated as ethereo-ponderable atoms.

41. A quiescent charge of statical electricity, only affecting the superficies of any ponderable mass with which it may be associated, and having no influence upon the component ethereo-ponderable atoms severally, is not to be ascribed to redundancies or deficiencies of the ethereal matter, but to different states of polarization produced in different sets of the particles of such matter existing about the electrifiable bodies. During the action of an electrical machine, these particles are polarized by the opposite polarities transiently induced in the surfaces subjected to friction; one set of particles going with the electric, the other remaining with the rubber.

42. The particles thus oppositely polarized, severally divide their appropriate polarities with other ethereal matter surrounding the conductors, and this, when insulated, is retained until a further polarization results from the same process. Thus are the ethereo-electric atmospheres respectively surrounding the positive and negative conductors oppositely polarized, and consequently charged to the degree which the machine is competent to induce. Under these circumstances, if a rod be made to form between them a conducting communication, by touching each conductor with one of its ends, the polarities of the ethereo-electric atmospheres by which they are severally surrounded, propagate themselves, by a wave-like process, over the surface of the

* Philosophical Magazine, vol. 60, p. 172. 1822.

conductor, so as to meet midway, and thus produce reciprocal neutralization.

43. In proportion, however, as a wire is small in comparison with the charge, which it may be made the means of neutralizing, the conducting power, seems to be more dependent on the sectional area, and less upon the extent of surface. The reciprocal repulsion of the similarly polarized ethereal particles, must tend always to make them seek the surface, but at the same time, their attraction for the ethereo-ponderable particles composing the wire has the opposite effect, and tends to derange these from their normal polar state of quiescence. In proportion to the degree in which this state is subverted, is the resulting heat, electrolytic power, and electro-magnetic influence. The phenomena last mentioned, are, however, secondary effects consequent to the participation of the ethereo-ponderable matter in the undulations resulting from the statical discharge.

44. Such effects, making allowance for the extreme minuteness of the time occupied by the process, are probably, in all cases, proportional to the degree in which the ponderable matter is effected, up to the point at which it is dissipated by deflagration; but the duration of a statical discharge, being almost infinitely minute for any length of coil which can conveniently be subjected thereto, the electro-magnetic and other effects of a statical discharge are not commensurate with the intensity of the affection of the wire.

45. There is, in fact, this additional reason for the diversity between the electro-magnetic power of a statical discharge, as compared with that of the voltaic series: any wire which is of sufficient length and tenuity to display the maximum power of deflagration by the former, cannot serve for the same purpose in the case of the latter. Moreover, the form of a helix closely wound, so that the coatings may touch, which is that most favourable for the reiteration of the magnetic influence of the circuit upon an iron rod, cannot be adopted in the case of statical discharges, of high intensity, since the proximity of the circumvolutions would enable the ethereal waves, notwithstanding the interposition of cotton or silk, to cross superficially from one to the other, parallel to the axis of the included iron, instead of pursuing the circuitous channel afforded by the helix with the intensity requisite to the polarization of the ponderable atoms.

46. The intensity of the excitement produced by different electrical machines, is estimated to be as the relative lengths of the sparks which proceed from their prime conductors respective ly. Admitting that the relative intensity were merely as the length of the spark, not as the square of that length, still there would be an immense difference between the intensity of a vol-

taic series and that of electrical machines if measured by this test. Large electrical machines, like that at the Polytechnic Institution, London, give sparks at twenty inches and more; while, agreeably to Gassiot's experiments, a Groves battery of 320 pairs, in full power, would not, before contact, give a spark at any distance, however minute. It follows, that, as respects that species of intensity which is indicated by length of sparks, or striking distance, the difference between the electricity of the most powerful voltaic series and electrical machines is not to be represented by any degree of *disparity;* it is rather an utterly discordant feature; it is a trait in which there is an extreme dissimilitude.

47. It should be recollected that the intensity of galvanic action in a series of 320 pairs, excepting the loss from conduction, would be to that of one pair as 320 to one.*

48. We may infer that the undulatory polarization of ethereo-ponderable matter, is the primary, direct, and characteristic effect of galvanic excitement in its more energetic modifications. Yet that by peculiar care in securing insulation, as in the water batteries of Cross and Gassiott, ethereal undulations may be produced, with the consequent accumulation of ethereal polarity requisite to give sparks before contact, agreeably to the experiments of those ingenious philosophers. Hence it may be presumed, that, during intense electro-ponderable polarization, superficial ethereal waves may always be a secondary effect, although the conducting power of the reagents, requisite to the

* According to Colomb's experiments, electrical attraction and repulsion are as the squares of the distances, and the force of the inductive power of statical charges which are produced by those forces, must, of course, obey the same law. Also the spark which is the result of these powers should come under this law since it must be as the generating forces. That the inductive influence has a growth commensurate with the electrifying energy is shewn by the fact ascertained by Wheatstone, that, when a jar is discharged by two very long wires, the sparks at the two ends are simultaneous, though one produced midway by the same discharge, when tested by his ingenious process, is later in a minute degree. It follows, that the spark must be as the precursory generating induction, and, of course, obedient to the same rule.

If this calculation be correct, the intensity must be as the squares of the striking distances as indicated by sparks.

It may be urged that the striking distances as measured by the length of the sparks, is in the compound ratio of the quantity and intensity. As to the quantity, however, galvanic sources have always been treated as pre-eminent in efficacy, so that on that side there could be no disparity. Moreover I have found that in galvanic apparatus, of only one or even of two pairs, as in the calorimotors, the intensity lessened as the surfaces were enlarged. By a pair of fifty square feet, of zinc surface, a white heat could not be produced in a wire of any size, however small. The calorific power of such apparatus can only be made evident by the production of a comparatively very low temperature, in a comparatively very large mass

constitution of powerful galvanic batteries, is inconsistent with that accumulation of ethereal polarity which constitutes a statical spark-giving charge.

49. In a battery consisting of one galvanic pair excited by reagents of great chemical energy, and conducting power, the calorific and electro-magnetic effects are pre-eminent; but in De Luc's electric columns, consisting of several thousands of minute pairs, feeble as to their chemical and conducting efficacy, statical phenomena predominate. This seems to be quite consistent, since on the one hand the waves of polarization must be larger and slower, as the pairs are bigger and fewer; and on the other hand smaller and more active, as the pairs are more minute and more numerous. Of course the more active the polarizing waves, the more extensive must be the sphere of their influence.

50. The extent of metallic surface being constant, the greater the number, the smaller the pairs, and the less the retro-conducting power of the exciting reagents, the greater the resemblance of the phenomena to purely statical electricity, since the ratio of the ethereal to the ethereo-ponderable waves is in that construction the greatest: vice versa, the smaller the number and the larger the pairs, or the more intense the reaction of the ponderable agents, the more the phenomena prevail, heretofore ascribed to quantity, but really due to the greater proportional association of ponderable matter in the atoms subjected to the electro-polar forces.

51. If, by means of a sieve, or any other means, iron filings be duly strewed over a paper, resting on a bar magnet, they will all become magnets, so as to arrange themselves in rows like the links of a chain. Each of the little magnets thus created, will have a polarity opposite to that of the pole of the bar magnet, which influences it at its end nearest that pole. Of course the resulting ferruginous rows formed severally by the two different poles of the bar, will have polarities as opposite as those of the said poles.

52. In an analogous mode, if two wires be made the media of a galvanic discharge, iron filings, under their influence, will receive a magnetic polarity, arranging themselves about each wire like so many tangents to as many radii proceeding from its axis. Those magnetized by one wire reacting with such as are magnetized by the other.

53. The affections of the ferruginous particles during the continuance of the current so called, are precisely like those of the same particles when under the influence of the bar magnet. The great discordancy is in the fact, that the influence of the magnet is perma-

* As the word ether is used in various senses, the syllables "*electro*" being prefixed, serve to designate that which is intended.

nent, while that of the wire is indebted for existence to a series of oppositely polarizing but transient impulses which proceed towards the middle of the circuit from each side, so as to produce reciprocal neutralization by meeting midway.

54. The effect upon the filings, as originally pointed out by Oersted, is precisely such as would arise were the ponderable matter of the wire, resolved by each impulse into innumerable little magnets, situated so as to form tangents to as many radii proceeding from the axis of the wire.

55. Independently of the filings, the wires react with each other as if their constitution, during subjection to the discharge, were such as above supposed. When the discharges through them concur in direction, they attract, because the left side of one is next the right side of the other, bringing the opposite poles of their little magnets into proximity; but when the discharge is made in opposite directions, the two right or the two left sides will be in proximity, and will, by the consequent approximation of the similar poles of the little magnets, be productive of repulsion.

56. From these last mentioned facts and considerations, it must be evident that, assuming the existence of a permanent polarity in the particles of a magnetized bar, and of transient equivalent polar affections within a galvanized wire, involves no contradiction, no absurdity, nor any thing but what is consistent with the researches and inferences of Davy, Faraday, and other eminent investigators of the phenomena of nature.

57. In order that an ethereo-ponderable particle of oxygen in any aqueous solution shall unite with an ethereo-ponderable particle of zinc in a galvanic pair, there must be a partial revolution of the whole row of ethereo-ponderable zinc atoms, with which the atom assailed is catenated by the attractions between dissimilar poles. Moreover, at the same time that the metallic atoms are thus affected, the atoms of water between the metallic surfaces must undergo a similar movement, by an analogous reaction with poles of an opposite character, and this movement must extend through the negative plate to the conductor by which it communicates with the zinc or electro-positive plate. When the circuit is open, the power of combination exercised by the zinc and oxygen is inadequate to produce this movement in the whole chain of atoms, liquid and metallic; but as it is indifferent whether any two atoms are united with each other, or with any other atoms of the same kind, the chemical force easily causes them to exchange partners, as it were, when the whole are made to form a circuitous row in due contiguity.

58. As we know that during their union with oxygen, metals give out an enormous quantity of heat and electricity, (33) it is reasonable to suppose that whenever an atom of oxygen and an atom of zinc jump into union with each other, a wave is induced in the

ethereo-ponderable matter, and that this wave is sustained by the decompositions and recompositions by means of which an atom of hydrogen is evolved, at the negative plate, and, probably, enabled to assume the aëriform state. There must, at the same time, be a communication of wave polarity by its contact with the surface of the negative plate, by which the positive wave in the conductor is induced. Although the inherent polarities of the metals are not, agreeably to this view, the moving power in galvanism, yet they facilitate, and in some cases induce the exercise of that power, by enabling it to act at a distance, when otherwise it might remain inert.

59. This, I conceive, is shown in the electrolytic effect of platina upon a mixture of the gaseous elements of water; also in Groves' *gas* battery, by means of which hydrogen and oxygen gas severally react with water in syphons, so as to cause each other to condense, without any communication besides that through the platina, and an electrolytic decomposition and recomposition extending from one of the aqueous surfaces in contact with one of the gases, to the other surface in contact with the other gas.

60. The various forms of the electric spark, resulting from varying the gas, through which it may be made to pass, agreeably to the researches of Faraday, is explained by the supposition that the luminosity of the spark is partially the consequence of the polarizability of the ethereo-ponderable atoms of the gases through which the discharge is made, and consequently varies with their nature.

61. The reciprocal influence of galvano-electrical currents, and of such currents with magnetized or magnetizable masses, are well designated as *electro*-magnetic or *magneto*-electric, accordingly as the current or the magnet is the primary agent. There are, however, two other species of electro-polarity which come under the head of statical electricity. One of these Faraday illustrates by supposing three bodies, A, B and C, in proximity, but not in contact, when A, being electrified, electrifies B, and B electrifies C by induction. This Faraday calls an *action* of the particles of the bodies concerned, whereas, by his own premises, it appears to me to be merely a superficial affection of the masses or of a circumambient ethereal matter. This species of polarization, to which the insulating power of air is necessary, affects the superficies of a body only,* being displayed as well by a gilt globe of glass, as a solid globe of metal. No sensible change appears to be produced in the ponderable conducting superficies by this inductive superficial electrification of masses; and hence, probably, there is no consequent magnetism.

62. The other instance of statical polarity, is exemplified by the charge existing in a coated pane or jar. In this case, according to Fara-

* According to Colomb and others.

day, the particles of glass are thrown into a state of electro-polarity, and are, in fact, partially affected as if they belonged to a conductor; so that insulators and conductors differ only in the possession in a high degree by the one, of a susceptibility of which the other is possessed to an extent barely perceptible. The facts seem to me only to show, that either an insulator or conductor may be both affected by the same polarizing force, the transmission of which the one facilitates, the other prevents. I am under the impression that it is only by the diruptive process that electricity passes through glass; of course involving a fracture. It gets through a pane or jar, not by aid of the vitreous particles, but in despite of their opposing coherence. The glass in such cases is not liable to be fused, deflagrated, or dissipated, as conductors are. It is forced out of the way of the electrical waves, being incapable of becoming a party to them. Discharges will take place through a vacuity, rather than through the thinnest leaf of mica. But if, as Faraday has alleged, from within a glass flask hermetically sealed, an electrical charge has been found to escape, after a long time, it proves only that glass is not a perfect insulator, *not "that perfect insulation and perfect conduction are different extremes of the same property."* On the contrary, the one is founded upon a constitution competent to the propagation within it of the electro-polarizing waves, with miraculous facility, while the other is founded either on an absolute incapacity, or comparatively an infinitely small ability to be the medium of their conveyance. The one extremely retards, the other excessively expedites its passage through a void.*

63. I infer that the magnetic influence of electricity, is always due to the electro-polarization of ponderable matter, in consequence of the incorporation with it of the polarizable electro-ether,* thus constituting, as above stated, ethereo-ponderable atoms.

64. Reference has been made to two modes of electrical conduction, in one of which the efficacy is as the surface; in the other, as the area of a section of the conductor. Although glass be substantially a non-conductor, the power of the surface of glass when moistened, or gilt, to discharge statical electricity is enormous. It has been generally considered, that as a protection against lightning, the same weight of metal employed as a pipe, would be more efficacious than in the usual solid form of a lightning rod: yet this law does not hold good with respect to galvanic discharges, which are not expedited by a mere extension of conducting surface. Independently of the augmentation of conducting power, consequent to the cooling influence of radiation, and contact with the air, which, according to Davy, promotes conduction, a metallic ribbon does not

* By a void, I mean a Torricillian vacuum. The omnipresence of the electro-ether must render the existence of a perfect void impossible.

conduct a galvanic current better than a wire of similar weight and length.

65. The sectional area of a conductor remaining the same, in proportion as any *statical* accumulation which it may discharge is greater, the effects are less superficial; and the ethereo-ponderable atoms are affected more analogously to those exposed to galvanic discharges. It is in this way that the discharge of a Leyden jar imparts magnetic polarization. Thus, on the one hand, the electro-ethereal matter being polarized and greatly condensed, combines with and communicates polarization, and consequently magnetism, to ethereo-ponderable bodies; while, on the other hand, these, when polarized by galvanic reaction, and thus rendered magnetic, communicate polarity to the electro-ether. Hence statical electricity, when produced by galvanism, and magnetism, when produced by statical electricity, are secondary effects.

66. Where a wire is of such dimensions, in proportion to the charge, as to be heated, ignited, or dispersed by statical electricity, there seems to be a transitory concentration of the electric power, which transforms the nature of the reaction, and an internal wave of electro-ponderable polarization, similar to those of galvano-electricity, is the consequence.

67. As above observed, (34,) the current produced by the magneto-electric machine, has all the attributes of the galvano-electric current; yet this is altogether a secondary effect of the changes of polarity in a keeper, acting upon a wire solely by dynamic induction. But if, by mere external influence, the machine above mentioned can produce within a circuit a current such as above described, is it unreasonable to suppose that the common machine, when it acts upon a circuit, may put into activity the matter existing therein, so as to produce waves of polarization, having the power of those usually ascribed to a galvano-electrical current?

68. It has been shewn that both reason, and the researches and suggestions of Faraday, warrant the inference that ponderable atoms, in solids and liquids, may be considered as swimming in an enormous quantity of condensed imponderable matter, in which all the particles, whether ponderable or imponderable, are, in their natural state, held in a certain relative position due to the reciprocal attraction of their dissimilar poles. An electrified body differs from one in its ordinary state, in having the polarity of the ponderable or imponderable matter existing within, or about it, one or *both* deranged.

69. In statical excitement the affection is superficial as respects the ponderable bodies concerned, while in dynamic excitement the polarities of the whole mass are deranged oppositely at opposite ends of the electrified mass; so that the oppositely

disturbing impulses, proceeding from the poles of the disturbing apparatus, neutralize each other intermediately. Supposing the ponderable as well as the imponderable matter in a perfect conductor, to be susceptible of the polar derangement, of which an electrified state is thus represented to consist, non-conductors to be insusceptible of such polar derangement, imperfect conductors may have a constitution intermediate between metals and electrics. When an electrical discharge is made through any space devoid of air or other matter, it must then find its way solely by the polarization of rare imponderable matter existing therein; and consequently its corruscations should be proportionably more diffuse, which is actually found to be true; but when gaseous ethereo-ponderable atoms intervene, they enable competent waves to exist within a narrower channel, and to attain a greater intensity. I consider all bodies as insulators which cause discharges through them to be more difficult than through a vacuum, and which, consequently, cannot be made to convey the waves from one body to another when the transfer would not take place in their absence. This furnishes a good mean of discrimination between insulators and conductors, the criterion being that a discharge ensues more readily as there is more of the one and less of the other in the way. Even when a bell wire has been dissipated by lightning, it has been found to facilitate and determine the path of the discharge. Both in the case of disruptive discharge through air, producing a spark, or of a deflagrating discharge through wire, causing its explosion, there is a dispersion of intervening ponderable particles; and yet there is this manifest discordancy, that in the one case the undulatory process of transfer is assisted, in the other resisted. The waves follow the metallic filament with an intense attraction, while they strive to get out of the way of those formed by the aëriform matter, as if repelled. Hence the term diruptive, from dirumpo, to break through, was happily employed by Faraday to designate spark discharges. The zigzag form of the diruptive spark, shows that there is a tendency in the aëriform particles to turn the waves out of that straight course, which, if unresisted or facilitated, they would naturally pursue. On the one hand the aërial filaments being unsuitable for the conveyanee of the electric waves, they are forced by them out of the normal path, first in one direction, then in another; while, on the other hand, the finest metallic filament furnishes a channel for the electric waves, so favorable that this channel is pursued, although the consequent polarization of the conducting particles be so intense as to make them fly asunder with explosive violence.

70. When a small image, of which the scalp has been

abundantly furnished with long hair, is electrified, the hairy filaments extend themselves and move apart, as if actuated by a repulsive power: also when iron filings are so managed as to obey the influence of the poles of a powerful magnet, they arrange themselves in a manner resembling that of the electrified hair. There is, moreover, this additional analogy, that there is an attraction between two portions of hair differently electrified, like that which arises between filings differently magnetized.—Yet the properties of the electrified hair and magnetized filings are, in some respects, utterly dissimilar. A conducting communication between differently electrified portions of hair would entirely neutralize the respective electrical states; so that all the electrical phenomena displayed by them would cease. Yet such a communication made between the poles, exciting the filings, by any non-magnetic conductor, does not in the slightest degree lessen their polar affections and consequent power of reciprocal influence. Upon the electrified hair, the proximity or the contact of a steel magnet has no more effect than would result under like circumstances from any other metallic mass similarly employed; but by the approximation, and still more, the contact, of such a magnet, the affection of the filings may be enhanced, lessened, or nullified, according to the mode of its employment. In the case of the hair, the affection is superficial, and the requisite charging power must be in proportion to the extent of surface. In the case of the magnetized ferruginous particles, it is the mass which is affected, and, cæteris paribus, the more metal, the greater the capacity for magnetic power. In the instance of the electrified hair, as in every other of statical excitement, the electrical power resides in imponderable ethereo-electric atmospheres which adhere superficially to the masses, being liable to be unequally distributed upon them in opposite states of polarity, consequent to a superficial polarization of the exciting or excited ponderable masses; but in the instance of bodies permanently magnetic, or those rendered transiently magnetic by galvanic influence, the ethereo-electric matter and the ponderable atoms are inferred to be in a state of combination, forming ethereo-ponderable atoms; so that both may become parties to the movements and affections of which the positive and negative waves consist. Since the electro-polarization, when carried to a certain degree of intensity, produces ignition, at other degrees deflagration, decomposition, or dispersion of conductors, it may be conceived, that in discharges too feeble to produce these consequences, there is still proportionably an affection of the ponderable matter.

71. I infer that the difference between the phenomena of statical electricity and those of galvanism does not arise from a

difference in quantity and intensity, but from the greater or less extent in which the polarity of the ponderable atoms of the masses affected are deranged. All magneto-polar charges, I infer to be attended by an affection of ponderable particles; and the reason why the most intense statical charge does not affect a galvanometer, is that it is only when oppositely excited bodies are neutralized by the interposition of a conductor, as during a discharge, that ethereo-ponderable particles are sufficiently polarized to enable them to act upon others in their vicinity, so as to produce a polar affection the opposite of their own. In this way dynamic induction is consistently explained, by supposing that the waves of polarization, in passing along one conductor, produce, pari passu, the opposite polarization in the proximate part of any neighboring conductor suitably constituted, situated and arranged to allow it to form a part of a circuit. A magnetized bar, so contrived as to rotate easily upon its axis, turns to the right or to the left, when made the channel of two opposite galvanic discharges, accordingly as the connections with the battery may be made. This may be explained by supposing that the opposite undulations (consistently with Oersted's idea) moving spirally, one to the right the other to the left, react with the polarized ethereo-ponderable particles of the magnetized bar, so as to produce revolutionary impulses.

72. It is only during the state of the incessant generation and destruction of what has been called the two electricities, that the circuit, which is the channel for the passage of the polarizing waves, is endowed with electro-magnetic powers. It was no doubt, in obedience to a perception of this fact, that Oersted ascribed the magnetism of a galvanised wire to a conflict of the electricities. Undoubtedly that state of a conductor in which, by being a part of an electrical circuit, it becomes enabled to display electro-magnetic powers, is so far a conflict of the two electricities, as the affections of matter which are denominated electrical consist of two opposite polar forces, proceeding, agreeably to the language of Faraday, in opposite directions from each side of the source, and conflicting with each other so as to be productive of reciprocal annihilation.

73. That a corpuscular change in conductors is concomitant with their subjection to, or emancipation from, a galvanic current, is proved by an experiment of Henry's, which he afforded me an opportunity, on one occasion, of witnessing. I allude to the fact that sound is produced whenever the circuit is suddenly made or suddenly ruptured. By I. P. Marrian it has been observed, that a similar result takes place during the magnetization or demagnetization of iron rods, by the alternate establishment or arrestation of galvanic discharges through wires coiled about them so as to convert each into an electro-magnet. Mr. Marrian represents

the sound as resembling that produced by striking a rod upon one of its ends.* †

74. Thus it appears that there is an analogy between the state of matter which involves permanent magnetism and that which constitutes a galvanic current, so far as this; that either by one or the other, during either its access or cessation, an affection of the ponderable particles concerned ensues, sufficient to produce sound.

75. Although waves originally purely ethereal, as when generated by a discharge from a conductor or Leyden jar, are prone to pass superficially; yet as the surface of the conducting wire becomes less, the reaction between the ethereal and ethereo-ponderable matter becomes greater; so that finally deflagration may be produced. Hence the inferiority of statical discharges in producing electro-magnetic power is explained by the fact, that this power being in the compound ratio of the quantity of matter affected and the intensity of the affection, neither condition can be augmented without a diminution of the other. In order to produce the intensity requisite to the polarization of the ponderable particles, we must lessen the number of these subjected to the discharge, and, of course, the numerical force which can be brought into the electro-magnetic battle-field.

Summary.

From the facts and reasoning which have been above stated, it is presumed that the following deductions may be considered as highly probable, if not altogether susceptible of demonstration.

The theories of Franklin, Dufay and Ampere, are irreconcilable with facts on all sides admitted.

A charge of statical electricity, or that species of electric excitement which is produced by friction, is not due to any accumulation, nor any deficiency either of one or of two fluids, but to the opposite polarities induced in imponderable ethereal matter existing throughout space however otherwise void, and likewise condensed more or less within ponderable bodies, so as to enter into combination with their particles, forming atoms which may be designated as ethereo-ponderable.

Statical charges of electricity seek the surfaces of bodies to which they may be imparted, without sensibly affecting the ethereo-ponderable matter of which they consist.

When surfaces thus oppositely charged, or, in other words, having about them oppositely polarized ethereal atmospheres,

* Agreeably to recent experiments of Faraday, the particles of a glass prism may be so influenced by an electro-magnet as to affect the passage of polarized light.

† L. and E. Phil. Mag. and Jour., vol. 45, p. 383, 1844.

are made to communicate, no current takes place, nor any transfer of the polarized matter: yet any conductor touching both atmospheres, furnishes a channel through which the opposite polarities are reciprocally neutralized by being communicated wave-like to an intermediate point.

Galvano-electric discharges are likewise effected by waves of opposite polarization, without any flow of matter meriting to be called a current.

But such waves are not propagated superficially through the purely ethereal medium; they occur in masses formed both of the ethereal and ponderable matter. If the generation of statical electricity, capable of influencing the gold leaf electrometer, indicate that there are some purely ethereal waves induced by the galvano-electric reaction, such waves arise from the inductive influence of those created in the ethereo-ponderable matter.

Magnetism, when stationary, as in magnetic needles and other permanent magnets, appears to be owing to an enduring polarization of the ethereo-ponderable atoms.

The magnetism transiently exhibited by a galvanized wire, is due to oppositely polarizing impulses, severally proceeding wave-like to an intermediate part of the circuit where reciprocal neutralization ensues.

When magnetism is produced by a statical discharge operating upon a conducting wire, it must be deemed a secondary effect, arising from the polarizing influence of the ethereal waves upon the ethereo-ponderable atoms of the wire.

Such waves pass superficially in preference; but when the wire is comparatively small, the reaction between the waves and ethereo-ponderable atoms becomes sufficiently powerful to polarize them, and thus render them competent, for an extremely minute period of time, to produce all the affections of a galvano-electric current, whether of ignition, of electrolysis, or magnetization. Thus, as the ethereo-ponderable waves produce such as are purely ethereal, so purely ethereal waves may produce such as are ethereo-ponderable.

Polarization of hair upon electrified scalps is supposed to be due to purely ethereal polarity, while that of iron filings, by a magnet or galvanized wire, is conceived to be owing to ethereo-ponderable polarity.

On Strictures of the Urethra. By JAMES BRYAN, M. D., Lecturer on Surgery, formerly Professor of Surgery in Castleton, Vermont, late Surgeon and Physician to the Philadelphia Dispensary, Member of the Philadelphia Medical Society, &c. &c.

In the whole range of surgical disease, there is unquestionably no one more inconvenient, distressing and obstinate, than "Stricture of the Urethra." Confined, as it is, to no age,—for according to the best authorities, it is found in youth and childhood,—continuing, as it generally does, during the whole of life after an attack, liable to occur at any moment, and placing in jeopardy the very life of the individual—it has ever been a subject of deep interest to the surgeon.

Unlike many other serious and persistent diseases, it is, unfortunately, one of very common occurrence. If, as Dr. Hunter says, "nearly every man has had gonorrhœa," so we may say, a large per centage, of those who have been thus afflicted, have obstructions to the free passage of the urine, in some form or other. Strictures of the urethra may be classified as follows: 1st, Spasmodic stricture. 2d, Permanent stricture. 3d, A combination of the first two.

Spasmodic Stricture.

Spasmodic stricture is a a simple closure of a portion of the urethral canal, by the contraction of some of the muscular fibres which surround it. This spasm may be in the circular fibres of the urethra itself; the compressores urinæ, or other portions of the muscular tissue, acting upon the passage. It is induced by some irritation, either local or general, either in the urethra itself, or acting upon some distant part, and producing the disease by sympathy. Like other diseases of this nature, it is found most frequently in persons of a nervous and excitable temperament. The irritation of gonorrhœa, in any or all of its stages, produces this form of stricture; it is not of course in this, or in purely sympathetic cases, dependent upon organic changes, in the form of deposits, for its existence. Although very distressing for the time being, producing for hours together complete suppression of the urinary discharge, yet it must be considered as a temporary disease. The application of cold water to the parts and cold to the feet, as recommended by Dr. Hall—or the reverse, warm baths, pediluvia and semicupia—are means which very frequently succeed in relaxing the stricture. In addition to these, the introduction of a catheter or sound, the use of opiate enemata, or, according to Dr. Hunter, "the crumb part of a new baked loaf,

warm from the oven, applied to the perineum;" a blister to the groin; hot steam to the scrotum and perineum, &c. &c. Of all these, the best by far and most certain, as well as the most expeditious, is the introduction of the catheter, previously warmed and oiled for the purpose. I have found it advantageous, in cold weather, either to allow the patient to remain in bed, or be in a warm room during the introduction of this instrument.

In some cases the disease assumes the character of periodicity, and I have had to evacuate the bladder at stated periods for several days, before the disease gave way, and this entirely independent of that form of stricture which sometimes takes place during the cold stage of an intermittent fever. When caused by some local irritation, the final cure of the disease must of course be sought by the removal of the cause. The old adage need scarcely be repeated, which says that "the removal of the cause cures the effect."

Permanent Stricture.

"A permanent stricture" (says Sir Everard Home) "is that contraction of the canal which takes place in consequence of coagulable lymph being exuded between the fasciculi of muscular fibres, and *upon* the internal membrane, in different quantities, according to circumstances; and, in the same proportion, diminishing the passage for the urine at that part, or completely closing it up."

This form of the disease is the result of inflammatory action in the tissues around the urethra, producing a deposit of coagulable lymph, which, by its bulk, infringes upon the diameter of the passage. As a general rule, the deposit is slow in its progress, and requires a considerable time to attain sufficient size to materially interfere with the passage of the urine. The symptoms consequently develope themselves gradually. Most generally, the origin, according to Sir A. Cooper, may be distinctly traced to one or more attacks of gonorrhœa, and this agrees with our experience. At the same time wounds of the parts, particularly contused wounds—a transfer of inflammatory action from neighbouring parts—are known to produce the same effects. The character which these deposits assume, (and they do *not involve* the lining membrane *of the urethra*, which, on the contrary, is corrugated in folds in the passage, over the uneven surface,) is that of a hard cartilaginous ring, partial or complete. The extent of the deposit, which may be felt through the parietes, as a hard substance along the urethra, varies considerably. According to Hunter and others, it is generally not greater than that represented by a *pack thread*, tied around the canal. Sir B. Brodie speaks of its being sometimes an inch or

an inch and a half in extent; and in a case which was treated by myself, it extended more than two inches along the passage, and could be felt externally by the patient and surgeon with the finger. Mr. Samuel Cooper, in his Surgical Dictionary, mentions a case of fistula where the entire urethra beyond, was closed. The number of strictures also varies in the same case; in many cases there is but one; in others there are two, three, or more strictures. As the diameter of the passage varies in different parts of its course, so the *seat* of stricture varies. Where the diameter is diminished or curved, the predisposition to stricture seems to be greater than in other parts. Hence the curve of the canal and the *bulb*, as it is called, are very commonly seats of the disease. In my experience, I have found that the most common seat is about 5½ inches from the external orifice; next to this, about 7 or 7½ inches; and lastly, about 3½ or 4 inches from the extremity of the penis. I have also seen them just within the orifice, and so small that a fine violin string of catgut, or small straws, were used by the patient to keep them open for urination.

Symptoms.

The first symptom of stricture is the obstruction, more or less complete, which it causes to the free passage of the urine. The stream will be changed in shape, forked, turned from its usual course, or fall perpendicularly from the mouth of the urethra in great drops and scattering. Some few drops will be retained in the passage, which will pass off after the rest, producing considerable inconvenience. The patient sometimes has to get up at night two or three times to evacuate his bladder, which is done with difficulty and with considerable effort. A weight and uneasiness is felt in the region of the perineum, and not unfrequently a gleety discharge issues from the urethra, which may be mistaken for gleet itself. The stream of urine gradually diminishes, inducing strong, "straining" efforts to accelerate it, until almost no stream passes, and the urine falls in drops or stops entirely. The latter, however, generally occurs after exposure to cold or other causes of inflammation, which, setting in, in the strictured part, closes the passage entirely;—or the closure may be induced by the spasmodic action of the muscles, as we shall see when speaking of the combined form of the disease. From a few weeks to eight or ten or more years, may, however, pass in the progress of the disease, ere this state of things takes place. One case lately treated by me, resulted from a very severe attack of gonorrhœa, contracted nine years before. The progress of the disease was gradual, until relieved by an operation. In another case, also cured by an operation, rather more than three years had elapsed. In a third case, about one

year, with repeated gonorrhœas, had induced a confirmed stricture.

In the early stages there is commonly very little pain or inconvenience; the impediment to free urination, which the patient may refer to any other cause than the right one, being the only symptom. In some cases considerable pain accompanies the disease. A patient now sitting by me says, to the question in reference to pain, that he never had any, but adds, that "now and then" he would feel pain in the vicinity of the anus, apparently rheumatic, which would wake him up at night, and would be relieved by pressure. The pain existed particularly when he was costive. Never suspected a stricture; the stream, he says, gradually diminished, but was variable. For a few days the obstruction would be considerable, and then for a month or two, it would be as usual, never, however, returning to the natural size of the stream. These paroxysms gradually became more frequent, the urine "dribbling" away with difficulty, until at length it entirely ceased, and he was forced to apply for immediate relief. The difficulty in urinating not only varied on different days, but at different times in the same day. An attempt in the morning would sometimes be a partial failure; an hour or two after, the attempt would be more successful. It affected his mind, and was itself affected by mental emotions. The latter, particularly anxiety of mind, increased the difficulty, while the appetite and spirits were affected by the disease. This, in fact, is known to be the case in most of the diseases involving the urinary or genital organs. One patient tells me that the venereal appetite in him, although of a pretty warm temperament, has been for years merely passive. The testicle, one or both, it is well known, also, sometimes become enlarged and painful, which may be mistaken for a very different disease. Whether the disease affects the procreative function or not, I am not able to say; but two gentlemen, both married men of four or five years standing, have neither of them children, and they attribute the fact to the disease.

Mixed Stricture.

The mixed form of the disease is one exceedingly common. The local irritation of the sub-inflammation, which no doubt exists in the stricture deposit, is sufficient to excite the spasmodic action of the muscular fibres, longitudinal or other, especially in nervous individuals. And these spasms are frequent sources of great pain and considerable danger. They no doubt react upon the strictured part, and assist in keeping up that amount of irritation which is essential to the progress of the disease. In these cases we have all the symptoms of simple spasmodic stricture, made more or less permanent by the perma-

nent deposits. The other and more general symptoms are all more intense from the general susceptibility of the system.

Consequences.

The consequences of long continued obstruction and stricture on the bladder and neighbouring organs are various. The bladder becomes, from the increased action, thickened and contracted, so that it sometimes will contain not more than one-fourth of the normal amount of urine. Hence the frequent disposition to evacuate this viscus. The mechanical obstruction, continuing for a certain length of time, will induce ulceration of the urethra, opening through the perineum; and we may have one or more fistulæ in perineo. This takes place sometimes in a short time, from acute inflammation setting in, establishing the suppurating process, which, in most cases, opens through the perineum. In other cases, when relief to the permanent obstruction of the passage is not obtained speedily, we may have rupture of the urethra or bladder, by which the urine is infiltrated into the neighbouring cellular tissue, and mortification and gangrene of the parts follow. Even death may be the consequence of this accident. We are of the opinion, however, that this result, particularly the phlegmonous inflammation opening in the perineum, can be avoided in most cases by the judicious surgeon. Some of our best writers speak of this as a matter of common occurrence. Certainly when it depends on the mechanical obstruction of a stricture, it ought to be avoided; the passage being easily opened by a proper instrument for that purpose. The enlargement of the ureters and pelvis of the kidneys, with more or less disease of the latter, are consequences of long continued obstruc tion of any kind in the urinary passages.

Treatment of Stricture.

The treatment necessarily divides itself into that which is appropriate to spasmodic, permanent, or the mixed form of the disease. In reference to the first, where it is simple and uncomplicated, the methods stated under the caption, "spasmodic stricture," will be found generally successful; being merely symptomatic or nervous. The modes of treatment there mentioned, particularly for immediate relief, the introduction of a moderate sized, smooth, warm, well oiled metallic sonnd, will be found effectual. The use of terebinthinates, opiates, or anti-spasmodics may be proper for the purpose of permanently curing the disease. Where some irritation, either in the organs of digestion, on the general surface, (such as a blister, for instance) or in the bladder, produces the disease, the removal of the irritation will result in the cure of the stricture.

Treatment of Permanent Stricture.

This is divided by most authors into dilatation, cauterization and scarifications, followed by dilatation. The invention of the bougie and flexible catheter was considered by John Hunter as a very great improvement, in the treatment of strictures and other diseases of the urinary organs. And from that time to the present, they have been extensively used, not to say abused, in the treatment of strictures. Every tyro thinks he must try his skill in introducing this foreign body into the urethral passage. Precise instructions are given as to the mode of operating to effect this purpose, almost all of which, it is acknowledged, fail to ensure success. The curves of the canal—its unequal diameters—the fold and lacunæ of the lining membrane—the spasmodic action of the longitudinal and circular fibres—the contractions of the sphincter vesicæ, enlargements of the so-called third lobe and lateral lobes of the prostate gland, in addition to the very obvious one of permanent stricture, or morbid growth in the passage—are all so many difficulties which frighten the novice in his timid attempts at the introduction of a proper instrument. Our predecessors do not, however, seem to have been so timid; but, from their own experience, no doubt, caution us against using too much force, and either bruising the parts or producing an "artificial passage," and not always in the right direction, even the rectum having been entered, according to some writers. In these cases it is evident that a very unwarrantable amount of force must have been injudiciously applied. The very irregular course of the passage when several strictures exist, makes it necessary to be careful, and to *humour* the parts during the introduction of the instrument. As a general rule, we agree with the distinguished teacher, Professor W. Gibson, that a metallic sound, of proper or moderate dimensions, warm, and well oiled, is the easiest introduced: metallic catheters, not too large, come next. The passage seems to become straight, or rather the inequalities yield better, to these instruments, particularly when they fill well the diameter of the canal. I have seen a spasmodic stricture overcome in this way when all others had failed.

The process of dilatation presupposes of course the introduction of some dilating body—which shall press outwards the parietes of the stricture or strictures. Where the contraction is considerable, a very small bougie is gradually introduced and allowed to remain, sometimes for several hours. After this, one a size larger, say the next day or shortly after, this to be followed by one still larger, until the diameter is increased to the natural size. Dr. Physick, we have understood, was accustomed to require his pa-

tient to obtain for himself a dozen bougies and catheters, of assorted sizes; from the smallest up to one almost twice as large as the natural size of the canal. Dilatation was carried to the extent of enlarging the urethra to a very considerable extent beyond the usual size. This was with the view of preventing too sudden contraction in the strictured part afterwards—which, however, was almost sure to take place, particularly in the cartilaginous forms of the disease where Sir B. Brodie says the dilation is "so important."

There are we believe, at least two forms of permanent strictures, perhaps three, in which something like a radical cure may be expected from the introduction of the metallic dilator. These are: firstly; the thread-like stricture, which divides the passage in the form of a thin diaphragm, and is torn by the instrument in an attempt to part it. The hemorrhage which follows, indicates the rupture of some small vessels. We have seen a number of cases where this appeared to be the case; and the cures were at once complete and permanent. Secondly, when soft, fleshy or polypic growths obstruct the passage, as they do those of the ears, rectum or uterus, these bodies being of a soft friable nature, easily give way, and are destroyed by the solid instrument. Thirdly; in the case of simple bands, as explained by Sir A. Cooper, when these bands are not too strong and resistent; they are perforated, and broken up by the means taken to dilate the urethra.

With regard to the use of the gum catheters, in strictures, Sir B. Brodie, after decribing the mode of introduction, &c.—points out the cases to which he conceives them to be applicable, as follows:—"1stly. When time is of much value, and it is of great consequence to the patient to obtain a cure as soon possible.

2dly. When a stricture is grisly and cartilaginous, and therefore not readily dilated by the ordinary methods.

3dly. Where from long continuance of the disease the urethra has become irregular in shape; or where a false passage has been made by previous mismanagement. Under these circumstances, if you can succeed in introducing a gum catheter, and let it remain for a few days in the bladder, you will find your difficulties at an end; the irregularities will disappear, and the false passages will heal.

4thly. Where a severe rigor follows each introduction of the bougie. This disposition to rigor is such, that it is impossible to proceed with the treatment in the ordinary way. Observe, in these cases, when the rigor takes places, it seldom follows the use of the bougie immediately. It almost always occurs soon after the patient has voided his urine, and seems to arise, not as the immediate effect of the operation, but in consequence

of the urine flowing through the part which the urine has dilated. Now, if instead of a bougie, you use a gum catheter, and allow it to remain, the urine flowing through the catheter, the contact of it with the urethra is prevented, and the rigor is prevented also."—*Braithwaite.*

We beg leave to differ from the Baronet in reference to the two first cases mentioned. We do not consider that the treatment with the gum catheter *is* the most speedy in *all* cases. Nay, there is a class of cases in which the gum catheter is of no more effect than any other instrument *which cannot* be *introduced.* In the three cases stated above, where a cure is the result of a destruction of the parts, it may be an expeditious method; but even in those, the metallic sound or catheter is far better, and more certain. In the second case, or that in which the "stricture is grisly and cartilaginous," it is notoriously a very uncertain instrument as far as a cure is concerned. So much so, that cases go on daily, in spite of all attempts at dilation with the gum catheter, until the passage in portions of its course is well nigh and even entirely obliterated. In both these cases, *we* should be disposed, particularly in the latter, to counsel very different treatment. But we must proceed with the treatment.

The objects to be attained by the forcible entry of a bougie or sound or fluid, are, according to the best authorities: 1st. A free passage, at least temporarily, for the urine. 2d. Such an amount of dilatation as will relieve the patient from the immediate effects of the stricture. 3d. Ulceration of the strictured part, which will result in the destruction of the morbid deposit, and in this way leave the passage clear. 4th. It is supposed that dilatation, carried to a certain extent, will, without producing ulceration, induce such an action in the parts as will result in their absorption; and in this way cure the disease. Precise directions are given as to the amount of pressure, and time of its continuance, necessary to the accomplishment of these objects, without producing the much dreaded and really to be feared, artificial passage, with all its terrible consequences. The materials used for these purposes are, 1st. Wax or plaster cloth bougies. 2d. Gum elastic do. 3d. Catgut or gelatinous bougies; these of course for the smaller strictures. 4th. Bougies made of the bark of the American elm. 5th. Bougies of ivory softened. 6th. Metallic bougies either flexible or inflexible. 7th. Water or some other bland fluid *forcibly* injected, so as to induce an expansion of the stricture.

With respect to the first object to be obtained by the use of these instruments—we prefer decidedly the metallic inflexible sounds, or catheters, and next to these the wax bougies.

The second object may in our opinion be better and more certainly obtained, by well polished metallic instruments, *always* used with the greatest care, and in most cases *adding very* little more force than the weight of the instrument itself. We prefer introducing the instrument in the old way, viz. with its convex side upwards until the point reaches the curve, then *gradually* performing a semi-circular curve, without, however, allowing the instrument to stop in its course. The cito, in judicious hands, is the most likely to be the tuto and jucunde, in this neat little operation. Next to the metallic, the wax bougie armed with a good stilet, bent to the proper curve. Experience, however, proves that the relief is but temporary, in a great majority of the cases treated in this way.

The third object to be obtained, viz. ulceration, or such an amount of irritation as will induce a discharge, is recommended by Dr. Hunter, and many of the best surgeons up to the present day. The instrument is to be carefully introduced to the stricture and the extremity allowed to come in contact with the indurated parts. Gradual but firm pressure is to be applied for from five minutes to fifteen or twenty, and this to be repeated from day to day until the stricture begins to yield, and the instrument makes progress in the canal. Very great caution is necessary, in adjusting the instrument and applying the requisite degree of force. It is in this practice, that so many false passages are made—even through the substances of the prostate gland. Our view of this mode of treatment, in the cases where it is generally recommended, is that it is *bad* practice, and should not be resorted to in the present day. It appears to us to be altogether behind the age. The invention of the wax bougie and catheter was a great improvement in the days of Hunter and Pott, and certainly some improvements have been added since. These rough and uncouth processes should be placed along with many others, which have been entirely abandoned in modern days.

The fourth object, namely, the production of such an action in the parts as will induce absorption without ulceration, is too uncertain, except in the three cases mentioned, to be relied upon in a disease of so serious a character as permanent stricture.

One word in reference to the *forced* injections of fluids as a means of dilatation, and we have finished this part of our subject. A good epitome of the matter is given by Velpeau in the following words: "Trye, qui en a parlé le premier en 1784, dit en avoir retiré les plus grands avantages, et Sœmering avance que si le plus fine bougie ne peut pas franchir le rétrécissement, il injecte de l'huile dans le canal, dont il ferme aussitôt l'orifice, et qu'il presse ensuite d'avant en arrière pour faire marcher le

liquide. La mèthode de Bruninghausen est un peu differente : au moment où le malade veut uriner, il comprime l'urètre avec force derrière le gland, force le fluide à rétrograder, et croit détruire ainsi le retrécissement. En 1822 M. Despiney de Bourg a proposé un liquide purement émollient, poussé avec une seringue. M. Citadini qui a publié un travail sur ce sujet, conduit une sonde ouverte jusqu'à l'obstacle, tient l'urètre solidement appliqué sur elle, et s'en sert comme d'un siphon pour injecter avec toute la force nécessaire de l'eau tiède, ou tout autre liquide approprié, dans le canal. M. Amussat, qui s'est cru l'inventeur des injections forcées, se comporte a peu près comme M. Citadini. It veut qu'on applique une compresse autour de la verge, pour qu'il ne reste aucun vide entre la sonde et les parois du canal, puis qu'on adapte une bouteille de caoutchouc remplie d'eau au pavillon de cette sonde, et qu'on pousse l'injection en comprimant la poche élastique avec un tourniquet : mais on sent bien que, le prìncipe étant posé, il importe peu que le liquide soit projete par l'intermède d'une seringue, d'une soche en gomme élastique, du doigt, ou de tout autre manière."

The application of caustic to strictures was practised by Dr. Hunter, and has maintained its position in surgical practice ever since. Hunter's plan of application, was a very simple one. The end of a bougie was removed; the caustic (nitrate of silver) introduced, fastened with a piece of wax; and, the distance to the stricture having been previously measured, the caustic bougie was carefully and quickly introduced, and maintained for a moment in contact with the obstruction. This was repeated from time to time, as the case demanded, or the parts would permit; until a moderate sized instrument could be introduced. Various *portes caustiques* have been invented, for the purpose of more effectually applying this medicament. That of Ducamp was designed to enter the stricture and canterize from within outwards. The instrument of Lallemand was designed to pass the stricture and after projecting the caustic from a lateral opening in the silver catheter, the instrument was withdrawn, and, thus made to act upon the stricture, from *behind forwards.* These two processes and their modifications necessarily involve the passage of the strictured part. The treatment by caustic has found favour among the English and American surgeons, particularly the former. The French, however, as is common where the practice is popular on the other side of the channel, have never heartily adopted cauterization as a means of curing stricture. Sir E. Home, Sir A. Cooper, Sir B. Brodie, and a host of other distinguished British and continental surgeons have given their testimony in opposition to the use of caustic in stricture. It is probable that when it is at all proper, the simple plan of Hunter

as improved by Sir E. Home, will be found the most effectual as well as most practical. Sir B. Brodie gives his objections to the use of caustic for the following reasons.

1st. Although the caustic often relieves spasm, it also very often induces it. It is true that in many instances it enables a patient to make water with more facility; but in many instances, also, *it brings on retention of urine.* 2dly. Hæmorrhage is a more frequent consequence of the use of the caustic, than the common bougie, and it sometimes takes place to a very great and to an almost dangerous extent. 3dly. Where there is a disposition to rigor, the application of caustic induces rigors where there had been no manifest disposition to them previously. 4thly. Unless used with caution, the application of caustic may induce inflammation of the parts situated behind the stricture, terminating in the formation of abscess. There are strong arguments against its use, and yet this practice, next to dilatation, is the most generally adopted of any. No writer of eminence speaks upon the subject, however, without shedding some crocodile tears over the bad effects of caustic and dilatating instruments.

Scarification consists in light incisions made from within the stricture either outwards the instrument having perforated the strictured space, or from behind forwards, by means of a lancet which is made to project from the side of the catheter which contains it and has been introduced beyond the stricture. By pressing upon the stilet projecting beyond the proximal extremity of the *inflexible* catheter, the lancet is made to rise above the surface of the instrument, through a slit—either one side or the other—sometimes on the lower side, when the whole instrument is withdrawn beyond the stricture. In this way, the sharp edge of the blade, comes in contact with the strictured or *any other* part.

"Three instruments have been devised by Amussat, the peculiarity of which consists in their cutting upon a sliding oval button which is made to *hook behind the stricture.* 1. One which is called an urethratome, consisting of a conical steel cylinder a little more than half an inch long, armed with eight longitudinal cutting crests, projecting to the extent of a quarter of a line from the surface. This is carried down upon a mandrin, previously passed through the stricture, and the incision made from before backwards. 2. One called a bridle-cutter, (coupe-bride) resembling the exploring sound of the same surgeon. 3. One more complicated than the other two, consisting of a canula, cleft laterally for about half an inch at its anterior extremity for a sliding semicircular blade, and notched upon the opposite side to the depth of a quarter of an inch, to accommodate the rod which moves the little bar at the end. The instrument with the knife concealed, is carried down to the narrowed part. The oval bar is first pushed on with the rod, and then retracted, so

as to hitch against the bridle. A turn is then given to the canula, in order to bring the knife on the same side with the fold, which is to be divided by pressing the blade from before backwards against the bar." Some twenty cases are reported as treated by an instrument similar to this, by Dr. Victor Iványchich, of Vienna, who has written a learned and practical essay on the subject of strictures, which was published in 1846. It will be seen that all these instruments pre-suppose the stricture *passable.* They are therefore useless in the impassable form of the disease. Even in the ordinary and most common forms of the disease the orifice of the stricture is found on one side or the other, whereas these instruments are designed to pass through a *central* opening. Mercier, in his remarks on the anatomy, pathology and therapeutics of strictures of the urethra, published in the Gazette Medicale of April 5, 1845, has the following words on this subject: "L' orifice du retrécissement quelquefois central se trouve ordinairement plus prés d'un côté que de l'autre, et particulièrement de la parte superieure, à en juger par les empreintes qu' ont fait dessiner Ducamp et M. Segalas. On conçait qui cette paroi, qui est adhérente au corps du pénis obeisse moins qui l'inferieure qui est libre à la force centripète qui opère le retrécissement; mais jè crois aussi avoir remarqué que l'altèration de tissu existe plus souvent et à un degré plus avancé sur la partie inferieure." The difficulties which accompany the use of these comparatively modern instruments for cutting the stricture, have driven surgeons to the old practice of dilatation; caustic, for the most part, as we have seen, having been proscribed by the most distinguished surgeons. Velpeau, as is usual with him when prejudiced against any practice, uses the following strong and emphatic language against cutting strictures: "C'est donc une méthode que ne pourrait convenir qu' aux brides, aux reserrements valvulaires ou en demi-lune, aux nodosités fibreuses, et qui, hors de là, ne peut guère être tentée que par des gens irréfléchis denués de connaissance précise soit en anatomié soit en chirurgie, ou par des specialistes." He then proceeds to state the instruments used, and begins with that of Dorner, who, Iványchich says, "hat eine Röhre angegeben, durch welche ein stilet mit einer Lansettspitte," &c. He then speaks of Dr. Physick's, which was an instrument "from which a lancet *cutting on its lower edge*, could, by means of a stilet, be projected from the entering end."*

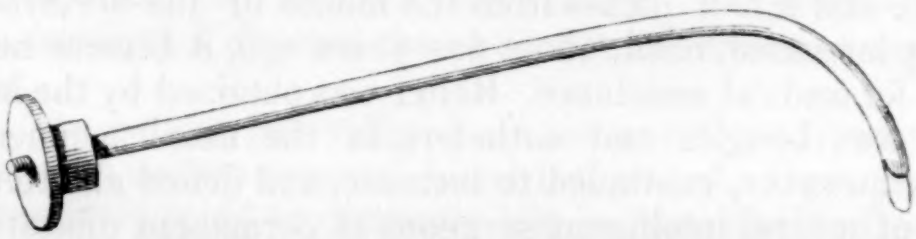
The ingenious instrument of Dr. Chew, made in this city by Mr. Schively, in 1828, consists of an ordinary silver sound, either straight or curved, and split at the entering end, so that an elliptical double edged knife can be projected, for a few lines, by pushing on a button which is attached to the stilet of the instrument. The point of the

* Pancoast's Operative Surgery.

knife is blunt and pierced for the passage of a silver wire. This wire, like that of Amussat and others, is the leader of the knife, and *must* pass the stricture ere the incision can be made—a sad defect, as may be seen by the remarks above on the position of the orifice of the stricture. Yet Prof. Pancoast says: "The probe head of the wire is gradually pushed on separately *through the stricture, which it readily passes* on account of the central position it necessarily occupies in the canal." Whether this "central position" refers to the stilet or the canal, it is equally fatal to the conclusion, for it is known that the orifice is *generally* on one side of the canal. The blunt extremity is also an objection; a free incision cannot be made. Dr. Physick's is objectionable, because it cuts only one side, and that downwards.

Malgaigne, in his Medicine Operatoire, page 668, remarks that, "Les scarifications (ou incisions internes) offrirent sans doute un grand avantage pour la dilatation au canal. Mais aucun des instruments ne nous parait assèz sûr dans son action. Il nous parait qu'au scarificateur pour remplir le but, doit, 1, agir sur tout l'éntendue de l'obstacle, et ne pas aller au-delá; 2, agir par incisions longitudinales; 3, inciser de la base du rétricssement á sonborde libre, pour être sûr de le deviser en entier."

This cannot be done by any of the above instruments; hence, we believe, the want of confidence which the profession has manifested in them. The accompanying cut represents an instrument which we have used with complete success, in the cartilaginous and impermeable form of stricture; in some cases when the popular mode of dilatation had entirely failed—and in fact (which we believe is generally the case in this form of stricture) had only increased the deposit, by keeping up the irritation from time to time, in the urethra. We cannot understand, in fact, how dilatation in this form of stricture, can ever effect a permanent cure. It must produce merely a temporary expansion of the parts, unless it establishes ulceration, which of course would tend to destroy both stricture and urethra.



The objections to cutting, offered by Velpeau, that the incisions will heal by the first intention, we think cannot hold, especially if the stricture be completely divided. The urine will certainly act as a foreign and irritating body, and prevent the adhesion of the parts; and we have found it so in practice after the use of the above instrument. We have not found that incision is a mere prelude to

more complete dilatation, but would strenuously recommend that no dilatation be resorted to after incision; except merely the introduction, now and then, of a common sized silver sound, as a means of precaution only. To attempt to dilate, in our opinion, would be to bring on additional irritation; and thereby tend to establish the stricture again. The stricture deposit is no doubt kept up by the continual or occasional pressure on the part from within, by instruments, or from without, by the action of the muscles.

The cut represents a flexible catheter,* with a slit in the distal end, perpendicular to the instrument, some two and a half lines long. A ring which is thick and strong, is attached to the proximal extremity. The stilet is two lines in thickness, with a button bur, on one end, which moves on a screw thread, to the extent of a quarter of an inch, and may be in this way moved backwards or forwards so as to control the extent to which the stilet is projected into the catheter. The other end of the stilet, has inserted into it a small blade, projecting three lines beyond the point of the stilet and the extremity of the catheter, which is the shape of the pointed thumb lancet, presenting a sharp edge, cutting *both* ways, upward and downward. The diameter is nearly the diameter of the catheter. The extent, forwards, to which the incision will extend, depends upon the position of the button on the other extremity. Three lines is the extent to which it may be pushed forwards. On account of the flexibility of both stilet and catheter, the instrument is equally adapted to the straight portion of canal as to the curved. Dr. Physick, it will be remembered, used two instruments, one for the straight, and the other for the curved portion of the urethra.

The following case will illustrate the practice with this instrument.

Mr. S. a gentleman about thirty-three years of age, applied to me for advice for a stricture which had been growing about nine years. It had originated in a most violent attack of gonorrhœa while at sea. Shortly after the cure of the gonorrhœa which was a long time in progress, a slight dificulty in urination was perceived about five and a half inches from the mouth of the urethra. This gradually increased, until, about five years ago, it became necessary to apply for medical assistance. Relief was obtained by the introduction of wax bougies and catheters, in the usual manner. The stricture, however, continued to increase, and defied all attempts on the part of several intelligent surgeons at permanent dilatation. So much had it contracted, that there was danger of a total stoppage, which had in fact frequently taken place for hours at a time, subjecting him to great danger of rupture of the bladder or urethra, and the usual results, fistulæ in perineo. When he applied to me he was totally unable to introduce any instrument, however small, as he had

*The size of the instrument is reduced two-thirds, in the drawing.

been in the habit of doing, for the purpose of relieving himself. No attempt on my part was successful in introducing an instrument into the bladder, or through any portion of the stricture, which commenced five and three eighths inches from the orifice of the urethra. In addition to this, being of a highly nervous temperament, the mere attempt at the introduction of an instrument, produced at first, fainting. Spasm of the parts also took place on the least irritation. His general health, in other respects, was good. The sexual function, he informed me, was languid, and the effort at coition ineffectual—the semen passing off some time after the orgasm guttatim; he has been married to a healthy and well formed lady for four years. She has had no children, and has not conceived.

After reflecting upon his case, I began to think that some means should be devised to divide at once this thickened and hardened stricture; for it could be easily felt through the perineum, in the form of a round hard body. I called upon our best surgical instrument makers, but found that they had no instruments for cutting strictures, as they were not used by the profession. After some consultation with Mr. Schively, I got him to finish me the one represented in the cut. With this instrument, on the 9th of September, after measuring the distance of the stricture, oiling my instrument, &c., I cut the stricture. The patient was seated in a chair, the instrument, with the lancet retracted, passed down to the obstruction; was held in the right hand with the index finger upon the top of the burr; the index and other fingers of the left hand were pressed upon the perineum, and served to guide the point of the instrument. When it was properly adjusted, so as to cut in the axis of the urethra, the burr was thoroughly pressed upon by the thumb of the right hand, and made to descend to the end of the catheter, the blade of course projecting its whole extent. The patient did not move a muscle of his face, and after partially withdrawing it, the second incision was made, without pain. The stilet was then retracted, and the whole instrument withdrawn, when, on introducing a gum catheter, it was found that it would pass half an inch further. To be sure of producing no mischief, I directed the patient to call the next day at the same hour.

10th. The patient had suffered no inconvenience from the incision, only one or two drops of blood had passed. In introducing the instrument it could be distinctly felt to pass the hard walls of yesterday's cut, requiring a very little more pressure than the other part. Two incisions were made as before, and a gain was made of nearly three fourths of an inch, making the improvement one and three fourth inches. The pain on cutting was rather more to-day than yesterday, but not enough to induce the patient to move the muscles of his face. Several drops of blood passed after the instrument. The stream of urine is rather better.

11th. One incision to-day with more than half an inch advance; rather more blood than yesterday, but very little pain. Suffers no pain in the interim between the operations. The stream of urine improves daily; very slight smarting after each incision.

13th. The fourth incision was made to-day in the same manner, with the improvement of *introducing* a small catheter into the bladder, the first for two years!! In the passage of this instrument, which was allowed to remain a short time in the canal, it was evident that the difficulty was not yet overcome. The catheter came out of a spiral form, and bent with the point upwards.

The stream of urine improved. More pain during this operation (cutting) than previously, but less blood.

14th. Prepared to use the Letheon, expecting to experience much pain, but on trying the metallic sound I found it would pass very easily, and a voluntary attempt at urinating produced a very good stream. I recommended him to wait a few days to see whether the relief would be permanent. He returned on the 16th, when I found that the sound which had passed so easily before, would not now pass. Some obstruction near the neck of the bladder, though the urine passed very well. I directed him to call on the next day, when I would try a silver catheter.

17th. Neither the sound or silver catheter will pass the obstruction. The parts cut are easily passed, but there seems some impediment still Operated for the fifth time, by simple incision, when on withdrawing the instrument, I *dropped* the silver catheter into the bladder. About half a drachm of blood followed this incision, and it was more painful than the others, but the passage is apparently complete, and permanently opened. The patient continued to call upon me every few days, and informed me that the silver catheter continued to drop into the bladder. The urine passed as free as ever it had, and not an unpleasant symptom had followed. I directed the occasional use of the silver catheter as a precautionary measure, but I believe it is of no further use. The cure remains complete up to the publishing of this article.

The incisions from without, which are the next form of incisions to be considered, can scarcely, we think, with the exception of *some* cases of fistulæ in perineo, be necessary. The plan of Sir B. Brodie, in his case, in which he operated with a modification of Mr. Strafford's instrument, and in which he *first made an external incision for the purpose of guiding more surely the instrument*, is one which, to say the least of it, as far as the stricture was concerned, was entirely unnecessary. The plan of cutting down upon a sound, and opening the urethra by projecting a trocar-pointed perforator, towards the external orifice of the urethra, is one that is proper in very bad cases of closure of this canal, complicated with one or more fistulæ.

It does not enter into our present plan to speak of the causes and treatment of fistula in perineo, as connected with stricture. We would merely state in conclusion, that our remarks resolve themselves into the following heads.

1stly. That stricture may exist in one of these forms.—Simple, as the result of recent or present inflammation in the part, producing a contraction of the part.—Confirmed, or that in which a deposit of some kind has taken place outside of the lining membrane of the urethra, so as to infringe upon the diameter of the canal. The most persistent, and formerly considered the most incurable of these forms, being that in which the deposit is cartilaginous. —Any one of the above forms may be complicated, and frequently is, with spasmodic stricture, which latter may also exist.—Without any permanent deposit.

2dly. That it is a disease, when found in the permanent form, seldom entirely cured by the ordinary means.

3dly. Some three forms of the permanent stricture may be relieved, and sometimes cured by rupture and dilatation.

4thly. That the more persistent forms of the disease had better be *cut*, whether combined with spasmodic action or not.

5thly. That the merely spasmodic form must be treated 'according to circumstances.'

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On the Causes and Treatment of Abortion and Sterility; being the result of an extended inquiry into the Physiological and Morbid conditions of the Uterus, &c., &c. By James Whitehead, F. R. C. S. Surgeon to the Manchester and Salford Lying-in Hospital. London, 1847.

Diseases of the Uterus have, of late years, engaged the attention of British and American practitioners in no inconsiderable degree; and we think justly. In the economy of the female, so important a rôle does the uterus play, that every thing relating to its diseased conditions cannot but be regarded as of very great importance. Hence the number of treatises which,

of late years, have appeared on this subject from the British press, not to speak of the translations from the French.

We well recollect the severe, if not abusive article, which appeared some nine or ten years since in a highly respectable British journal, against Balbirney, on the use of the speculum in uterine diseases. A great change, however, since that period is manifested in British practitioners and authors. Perhaps not a single book comes to us now from that country that does not speak of the speculum and its use as one of the legitimate means of the physician for forming his diagnosis. We are glad of all this. It shows an improved state of the medical mind; it affords proof that no means are to be discarded for accurately ascertaining the condition of any suffering organ; and we feel warranted in saying that, but for the speculum, no man could practice judiciously and properly in diseases of the vagina and uterus.

The above work contains 426 pages. Of these, 180 are upon the subject of menstruation; 159 upon the signs of pregnancy; 160 upon the causes of abortion, and the remaining 27 upon sterility.

Of the chapters upon menstruation and signs of pregnancy, it has not been our good fortune to see exactly the reason of publication; certainly not for occupying more than one-half of the volume. This part could have been omitted, we think, without detriment to the remaining portion of the work, though it would certainly have diminished the size of the volume. Still, these chapters are not without interest, and will bear reading.

In speaking of the function of the Ovaries, the researches of Lee, Bischoff and Raciborski, and others, are mentioned; but we find no mention of Pouchet of Rouen. This eminent physiologist, as long ago as 1835, taught the positive theory of the fecundation of the mammifera. His views, since published, are summed up in ten fundamental physiological laws and three accessory. Raciborski and Bischoff's subsequent labours are but confirmations of Pouchet's laws.

Spurious Menstruation—Pseudo-Pregnancy.

Three cases are given, together with the constitutional signs of this condition of the uterus. In all three, disease of the organ existed; and the author lays down the rule that it is invariably

associated with a morbid state of parts situated external to the uterine cavity, generally of its cervix and labia, sometimes of a portion of the vaginal mucous membrane.

Suppressed Menstruation.

A few interesting cases under this head are given—at the close of one of them, in which severe hysteric symptoms were present, and which terminated fatally, the author remarks:

"Hysteric affections are generally said by writers to be unattended with danger. Speaking of this form of disease, a modern author (Watson) says: 'It is a dreadful announcement to have to make to a father or mother that their child is epileptic, whereas hysteria, though it is sufficiently distressing, is attended in nine hundred and ninety-nine cases out of a thousand, with no ultimate peril to body or mind.' On the contrary, my belief is, that a greater amount of irreparable mischief has its origin in this class of affections in the adult female, than in derangement of any other system of organs, not excepting those of digestion and assimilation."

We are not sure that this is not a little too broadly stated; nevertheless, we feel confident that, at the commencement of menstruation, and for some years afterwards, hysteric affections are not to be regarded as of no moment, especially if, while the catamenia become obstructed from any cause, hysteric symptoms manifest themselves, the patient is in danger; for menstrual metastasis to the brain and spinal marrow may ensue, a condition of things almost always fatal.

Chapter 4th.—*On the last Menstrual Crisis.*—Endo-uteritis the author considers as one of the diseases liable to affect women at this period; but it is also found at other periods of life, and is not unfrequently the cause of dysmenorrhœa.

By Endo-uteritis, we are to understand an inflammation of the lining membrane of the uterus in part, or entire.

"In cases of endo-uteritis the body of the uterus is somewhat enlarged and painful under pressure of the finger; the cervix is slightly hypertrophied, but not so painful as the upper part of the organ, and it is generally free from abrasion. The only evidence of the existence of the disease capable of being revealed by the speculum, is the presence of the bright red ring surrounding the verge of the os uteri, together with the escape therefrom of the

characteristic fluid product, or of a small quantity of blood, which, by becoming incorporated with the vaginal mucous in its transit outwards, appears at the os externum in the form of sanies."

"The constitutional symptoms are, rigors and febrile excitation, which varies in intensity according to the severity of the local inflammation, or the peculiar constitutional susceptibility of the individual; lassitude; sense of fulness; weight and tenderness of hypogastrium; fixed pain in the inguinal region, occupying one or both sides; disordered digestion; irritable bladder; spinal irritation and convulsive affections."

Treatment of this affection. Leeches to the *hypogastrium*, or over the upper part of the sacrum; the exhibition of remedies to subdue the febrile action. When all febrile excitement is subdued, a more tonic plan should be pursued. Considerable benefit may be derived from injecting within the uterus, a weak solution of nitrate of silver in combination with ext. conii.

"R. Argent. Nitrat. gr. vj.
Ext. Conii ʒj.
Aq. destill. ℥j
Misce fiat injectio."

Or by the introduction of an ointment of the same material.

"R. Argent. Nitrat. gr. x.
Unguent Cetacei ʒss.
Liquoris Plumbi ʒss.
Misce, fiat Unguent."

"The latter form is applied by means of a small piece of lint fixed upon the end of a long probe, and fastened to the handle of the iustrument with a thread, with a view of securing its safe withdrawal. Not only does no disturbance or discomfort of any kind ensue upon the employment of these local measures, but, on the contrary, a beneficial change is often evident after the first application; and I have witnessed the suspension of pain to be instantaneous. The operation of injection is done with the aid of the speculum, by means of a long syringe, similar to Clarke's female syringe, having a nearly straight tube, with but one hole at its extremity. If carefully managed, from one to two drams of the remedy (which may be composed of different materials, varied in form and strength according to circumstances) will pass within the organ at each operation, most of which returns almost immediately. The temperature of the fluid, previous to being used, should be raised to 90° F."

We confess we have read this mode of treatment with some misgivings. We have never as yet even ventured to inject fluid into the body of the uterus. It may be unnecessary caution on our part; still we have never done it, lest an inflammation should be set up which might baffle all remedial means.

We should certainly think the saving clause, "when all febrile excitement has become completely subdued," ought to be rigidly adhered to.

CHAPTER 5. *Signs of Pregnancy.* We pass over this chapter and come to

CHAPTERS 7, 8, 9. *On the Causes of Abortion.*—These are the most interesting chapters in the book.

Two general causes; 1, disease of the cervix uteri; and 2, a venereal taint, are by far the most influential causes in the production of abortion.

Out of 378 cases examined carefully, 275 arose from diseases of the lower part of the uterus. What are these diseases? The author enumerates them as follows: 1. Inflammation, and superficial erosion of the cervix. 2. Varicose ulcer. 3. Œdema of the cervix. 4. Fissurated ulcer of the cervix. 5. Endo-uteritis. 6. Follicular ulceration.

To our mind the importance of attending to diseases of the cervix, in cases of abortion, cannot be too highly valued. Any one who will run his eye over the works on midwifery and the journals of the day, will perceive how inadequate are the means proposed to overcome abortion in an individual liable to abort. Rest, opiate injections, separation a thoro, all aid in certain cases; but most assuredly in many they fail.

Convinced, as we now are, of the frequency of diseased os and cervix uteri in recurring abortion in the same individual, we always call in the aid of the speculum. We have known, in more than one instance, a pregnant woman to be afflicted with what was termed a flooding, for months; abortion has followed; and on examination afterwards we have found a highly irritable state of all the parts, even extending to the bladder; a red, ugly looking ulcer, extending into the os itself, and oozing out from it a bloody fluid.

In all the forms of ulceration, escharotics to the ulcerated

surface are indispensably necessary, and, for the most part, an alterative course of mercury and sarsaparilla.

The author prefers leeching to the hypogastrium. We prefer leeches applied directly to the os uteri, and occasionally scarifications with a *sharp* scarificator, attached to a long handle.

The French practice of applying a hot iron to the part is not so painful as might be supposed, if done with tact and delicately; in some obstinate cases of ulceration it is a valuable agent, more terrible in appearance than in reality.

The author lays down the three following positions from the cases narrated in these chapters on abortion.

1. That what is commonly called ulceration of the cervix uteri may be the predisposing, as well as the immediately exciting cause of abortion.

2. That the purulent product of uterine ulceration, under some forms, at least, possesses virulent properties, capable of producing disease in another individual, or in another part of the same individual, by inoculation; and probably capable also, by being absorbed into the circulation of the same person, of materially disordering the fluids, and of creating thereby a peculiar susceptibility to disease.

3. That the application of caustics to the uterus, and the employment of other active measures which I have heard practitioners object to during pregnancy, as likely to endanger the well-being of the offspring, may not only be safely administered, but that they constitute in fact one of the principal means of securing both mother and child from danger.

Several cases are narrated of varicose ulcer of the cervix, and the appropriate treatment given. We have not room for more than the three points which the author lays down, and which, if proved by experience hereafter to be true, will clear up some heretofore anomalous cases of what is termed menstruation during pregnancy.

1. That menstruation during pregnancy is, for the most part, perhaps always, associated with an abnormal condition, generally with ulcerative disease of the uterus, requiring at all times active remedial treatment.

2. That hæmorrhage during pregnancy is not necessarily associated with an altered relation of the parts within the uterus,

and, by timely care, need not interfere with the integrity of the ovum.

3. That menstruation, during the early periods of lactation, is not always natural menstruation, but that it is generally associated with morbid conditions which are amply adequate to the satisfactory explanation of the phenomenon; that secondary hæmorrhage is, in the majority of instances, not owing to imperfect contraction, or atomy of the uterine fibres; and that the discharge very probably proceeds, under these circumstances, not from the inner surface of the uterus, but from the diseased surfaces situated upon parts external to the cavity of the organ.

Syphilis as a cause of Abortion.

The author confesses that when he commenced his investigations on the subject of abortion, he had no idea that syphilis was so common a cause as he afterwards was induced to believe it to be.

He thinks, and, we doubt not, justly, that the notion entertained of late by some that syphilis can be radically cured without the aid of mercury, is the cause of many disastrous consequences. Individuals have supposed themselves rid of this fearful disease, when, in fact, it was only covered over, as it were; subsequently they have married, and consequences most unhappy have followed. All practitioners in large cities must have seen examples of this kind. Mercury is to syphilis, what quinine is to ague. Without its use, in genuine syphilis, we do not think an individual safe.

The local pathognomonic signs of the uterus in a venereal taint are,

1. Endo-cervicitis, or inflammation of the lining membrane of the cervix uteri.
2. A mottled or patchy appearance of the cervix.
3. Apthæ of the cervix.
4. Warts on the cervix or walls of the vagina.

The author, as one of the remedial means, highly extols the Rumex Hydrolapathum. "I have used it for several years extensively, both in public and private practice, with the most gratifying results, in cases where sarsaparilla had been given in

large doses for many months together, without the slightest benefit."

Of Prolapsus Uteri it is said: "That prolapsus uteri can be effectually treated, and the position of the organ permanently restored, without the aid of the pessary, there exists not a doubt on my mind!" Would that this could be proved experimentally true! How much trouble, vexation, and disappointment at last, in this very affection, have not the fairest of our race suffered!

So far as our observation goes it confirms the following statement:

"The cases (prolapsus uteri) are generally accompanied with leucorrhœa, and with inflammation or ulceration of the cervix uteri, evidences of which are found in almost all instances to have prevailed at a period anterior to the occurrence of the displacement."

The treatment is to be directed locally to the diseased cervix, and generally to the constitution.

Of the first, nit. argent., or other suitable remedies; medicated tents are to be applied to the os, by means of a tube, and changed every one or two days. The metallic preparations should be used not oftener than every third or fourth day, vegetable applications, as matico, tannin, &c., being adopted intermediately.

Of the second, when all febrile excitement is absent, quinine, metallic oxides, iodine, iron combined with cinchona extract or taraxacum, gentian, &c.

Chapter 10. *Sterility.* It is true, as the author observes, that the cause of sterility is generally attributed to a faulty condition of the female organs. No doubt correctly. When we consider the complicated female genital apparatus, the chances are certainly vastly in favour of the faulty condition of this, as compared with that of the male.

The author, however, in this work proposes merely to treat of those cases of sterility, which result from a morbid state of the uterus, originally of a normal condition.

Three principal causes are mentioned, viz: 1. Endo-uteritis; 2. Spyhilis; and 3. Ulceration of the cervix.

The means employed in the treatment of the first and third, are such as have been already given—viz: local applications to the

diseased surfaces, and constitutional treatment of an alterative and tonic character, as iodide of iron and sarsaparilla.

In some cases, according to Mr. Whitehead, the uterus has resumed its natural function, after an appropriate course of treatment; leading to the hope that as our knowledge advances we may be more and more enabled to overcome this abnormal state of the uterine function, the cause often of much unhappiness.

We trust that the views expressed by the author of this work, especially on the subject of abortion, will be more generally entertained and carried out in daily practice. We feel confident that if they do become more generally understood, and practised upon, much suffering and danger will be obviated, and relief and comparative health afforded to those who otherwise may be doomed to drag out a miserable existence. †

The American Medical Almanac, for 1848, *containing statistics of the various Medical Colleges, Hospitals, Dispensaries, etc., of the United States; together with other information of value to the Physician and Student.* 18mo. pp. 224. Lindsay & Blakiston, Philadelphia.

The title page of this publication indicates very truly the character of its contents. Beside the account of Colleges, Hospitals, Dispensaries, private associations for granting instruction on the various branches of Medical Science, the work contains the organization of the National Medical Association; the code of ethics adopted by the late National Medical Convention; a chapter on Poisons, their antidotes, and the treatment proper in cases in which the various poisons have been taken; several articles on the inhalation of ether; Dr. Burder's letters on the importance of promoting the religious welfare of patients, and various miscellaneous articles of general interest to medical men, making altogether an exceedingly interesting and useful volume.

THE MEDICAL EXAMINER.

PHILADELPHIA, DECEMBER, 1847.

BRITISH AND FOREIGN MEDICAL REVIEW.

The October number of this admirable Review announces that it is the last which we are to receive. It is melancholy for us to state, that its discontinuance is owing to its never having received such a patronage from the profession as to authorize its distinguished editor to continue it. Still he persevered in his useful exertions until prudence compelled him to abandon the undertaking, and to permit it to pass into other hands, under another form. We have watched this Journal from its inception to its termination. Not a number has escaped our attention; and not a number has been issued that has not afforded us valuable instruction. We are amongst those, who daily feel, more and more, how much we have still to learn, and who mourn over our limited knowledge,—albeit there is no want of effort to maintain ourselves *à portée* with the existing state of science. Doubtless, happy, thrice happy, are they who can admit that "ignorance is bliss;" but this privilege has been denied to those who feel irresistibly, that their life must be spent in incessant toil to allay that thirst for knowledge, which has been implanted in them by the author of nature. To slake this thirst how effectual have been the pure waters issuing, from time to time, from the fount now about to be closed to them. To the profession at large—and especially to the reading, thinking, studying portion—alas! how few in number! the privation of their accustomed intellectual treat from abroad will be felt like the loss of a cherished friend and counsellor; whilst those who are engaged in the active and important occupation of teaching will deplore that one great source of their information, in regard to the novelties and the niceties of science, is about to be shut out from them. May we not hope that the amalgamation of the British and Foreign Medical Review, with its elder brother—the Medico-Chirurgical—may supply the place of the lost one; and that the 'wonted fires' of each parent may burn more brightly in the progeny.

Of Dr. Forbes—who we regret to find is to have no connection with the new Journal—we take our leave with extreme regret; trust-

ing, however, that we shall have constant occasion to witness the continuation of his valuable services to the profession, of which he is so distinguished an ornament. Highly accomplished as a general and professional scholar: dignified and chaste in his language: forcible and fearless in the expression of his opinions: skilled in the selection of reviewers, who were fully competent to their elevated vocation, he was eminently calculated for the lofty editorial position he maintained for the last eleven or twelve years; and although there may be some who writhe under the stripes which he not always mercifully inflicted—and who may not be disposed to kiss the rod that chastened them—we must confess, that in no instance, in our recollection, have we been able to detect unfairness, or to feel that the lashes, although well laid on, were unmerited.

Taking the British and Foreign Medical Review as a whole, we might be justified in indulging the fear, that we may not readily "look upon its like again," seeing, that at the termination of its career, we can state even more fervently than we have done on former occasions, our own conviction that it is—and ever has been—the very best medical review which has appeared in the English language. May we be able to say as much of the "British and Foreign Medico-Chirurgical Review," when it has passed through a long, and we hope glorious course. Whilst we grieve at the loss of its great progenitor, we shall hail its advent with unmixed pleasure.

ADULTERATION OF DRUGS.

Constantly have we complaints in the journals of sophistications of many of the most important articles and preparations of the materia medica. The evil has now become so crying, that the College of Pharmacy of New York has decided on petitioning Congress to pass a law, authorizing the appointment of an inspection at the Custom House of imported galenicals and chemicals, and the confiscation of such as are not approved of. In this petition the different medical schools will doubtless unite, as the Jefferson Medical College has already done. We may remark, by the way, that we have recently examined a specimen of the *Pilula Hydrargyri*, prepared by steam power at the chemical laboratory of Mr. George W. Carpenter of this city, which may be depended upon as genuine. It is made in the same manner as at Apothecaries' Hall, London, and the mercury is completely extinguished. This is one of the imported articles which has been most frequently found wanting.

MEDICAL CLASSES IN PHILADELPHIA.

A month has now elapsed since the lectures commenced in the Medical Schools of Philadelphia, and we are enabled to state that at no former period has the number of students in attendance been greater. Precisely how many are in the city, until the catalogues appear, it is impossible to tell; we have heard the number variously estimated, from a thousand to twelve hundred. Eleven hundred, probably, is not far from correct.

THE ASIATIC CHOLERA.

The foreign journals continue to furnish the unwelcome intelligence of the march of this pestilence in its old track. At Trebizonde, it appeared on the 9th of September, and continued to increase until the 15th, when the attacks became less numerous, and on the 18th the disease appeared to be on the decline. There had been 300 cases, of which 103 proved fatal. The government medical officer at Trebizonde has remarked that the disease is not so violent as that which formerly devastated Europe, and he adds, that of those who applied to him for advice he saved 90 out of 100. Some cases had been reported in the villages in the neighbourhood of Trebizonde. The disease prevailed both at Bagdad and Imaur-Ali, about the same period, (September.) Late accounts also state that it had appeared at Moscow, and that "Colonel Stalupin, an aid-de-camp of the Emperor of Russia, had fallen a victim to it." The disease had likewise appeared at Odessa. The *Gazette Medicale*, of the 9th of October, informs its readers that "the Cholera has passed the frontiers of Gallicia, and is now spreading through Silesia and Moldavia."

The Dublin Medical Press of the 13th of October, observes: "It is with regret we perceive by announcements in the daily journals that the Asiatic Cholera has reached the interior of Europe, and is gradually extending itself in a north-westerly direction. It is credibly reported that several cases have occurred at Charkav, in south-western Russia, and at Kiev, a large town on the right bank of the Dnieper, and on the frontiers of Poland."

From all the accounts we have seen, it would appear to be certain that the Asiatic Cholera is approaching us by the same route as on the former occasion, and there is great reason to apprehend that it will reach this Continent during the next year. Should such be the case, it is to be hoped that it will not be preceded or accompanied by a similar panic, and that those of the profession who may be obliged to combat it will not desert the established principle of our

art, and the evidences of their own senses, to run after every empirical suggestion that may be put forth by ignorance and credulity. It is furthermore to be hoped, that the opportunity will not be allowed to pass, as before, without suitable efforts to establish the pathology of the disease. Chemistry and the miscroscope should be diligently invoked, to reveal the condition of both the solids and the fluids, including all the secretions.

NEW YORK ANNALIST.

We regret to find that our well-intended compliment to our brother of the Annalist, on the entrance of his journal upon its *second year*, is deemed by him "*equivocal.*" We assure him that we meant to express no doubtful praise, but unreserved commendation of the zeal and ability displayed in his spirited publication, and a hearty wish for its continued prosperity. A remembrance of the fate of several of his predecessors, and at least one contemporary, in "the Commercial Metropolis," was well calculated to make us rejoice that a better destiny seemed to await him.

RECORD OF MEDICAL SCIENCE.

Health of the City of New Orleans.—We shall continue hereafter, as heretofore, to make a few passing remarks upon the sanitary condition of our city. In our September number, it was stated that the Board of Health had declared the yellow fever to be epidemic. Events which have transpired since that announcement, have fully verified, we regret to say, the assertion of the Board.

The fever made its appearance about the 1st of July, and began to decline, in accordance with the laws of epidemics, about the latter part of September; and by the 1st of October, the deaths daily were about ten. Thus the epidemic, as such, raged about six or seven weeks. It attacked many who had passed unaffected through the season of 1839 and '41; some who had been permanent residents for several years, fell victims to the disease. In some of its features it differed from former epidemics.

We had fewer cases of black vomit; and many who were attacked with this usually fatal symptom, recovered. In many cases, the fever terminated in 24 hours; in others it raged for 56 or 72 hours Nor was the issue of the case materially influenced by the duration of the

fever. Since many in whom the fever continued for three days, recovered as promptly as those in whom it ceased at the end of 24 hours. Throughout the disease, the head-symptoms were striking and obstinate ; and many, very many, succumbed with all the symptoms of congestion of brain.

As it is not our object to go into a description of the disease, we shall confine ourselves to the statistics on the subject. After much labor and great care, we have compiled from the published reports of the Board of Health the following statement, which will speak for itself.

Interments in the city of New Orleans, from the 3rd of July, to the 18th October, 1847, inclusive.

For the week ending				10th	July.	Total	138,	5	of yellow	fever,
"	"	"	"	17th	"	"	143,	6	"	"
"	"	"	"	24th	"	"	131,	16	"	"
"	"	"	"	31st	"	"	177,	47	"	"
"	"	"	"	8th	Aug.	"	263,	118	"	"
"	"	"	"	15th	"	"	353,	197	"	"
"	"	"	"	22d	"	"	443,	322	"	"
"	"	"	"	29th	"	"	461,	328	"	"
"	"	"	"	5th	Sept.	"	540,	435	"	"
"	"	"	"	12th	"	"	491,	355	"	"
"	"	"	"	19th	"	"	257,	169	"	"
"	"	"	"	26th	"	"	181,	85	"	"
"	"	"	"	3rd	Oct.	"	149,	61	"	"
"	"	"	"	10th	"	"	126,	44	"	"
From the 10th to the				18th	"	"	148,	53	"	"
Total							3990,	2241	of yellow fever.	

Interments in the city of Lafayette, from 26th of July to 21st of September, 1847, inclusive. Total, 793, of which 498 were of yellow fever. Thus making the total of deaths from all diseases during the time specified—in both cities—4,783, of which 2,739 were from yellow fever.

The above table will convey quite a correct idea of the state of health of our population from the 3d of July to the 18th of October, 1847.

From the foregoing table it will appear that the epidemic reached its acme about the 1st of September, and after that date it gradually declined. During the prevalence of the fever, it has been computed that between twenty and twenty-five thousand persons were attacked with the disease ; this, however, is more a matter of conjecture than accurate calculation.

On the 18th of October, the Board of Health published the following statement:

Meeting of the Board of Health, October 18th, 1847.

The Board of Health feels authorized to make the announcement that the yellow fever, which has been prevailing for some months as

an *epidemic*, has, for some time, ceased to exhibit this character, and as such has now disappeared. At the same time it is proper to state that the *sporadic* cases, which have always been seen for one or two months after the disappearance of epidemic yellow fever, must still be expected to prevail.

Signed, W. Stone, *Chairman.*

W. T. Brent, *Secretary pro tem.*

As the yellow fever declines, our ordinary autumnal diseases begin to make their appearance. We have now under treatment two cases of typhoid fever in private practice; they are very obstinate, one 17 days standing, and not yet convalescent. Since the commencement of the fall season, the sky has been clear, the air cool and bracing, and but little rain to interrupt out-door business.—*New Orleans Medical and Surgical Journal.*

Magnetized Gold and Tonic Pills.—Human ingenuity is equal to the demands of unsatisfied ignorance in the matter of medicine. On looking over the catalogue of nostrums which have been in repute within half a dozen years, together with those now enjoying a full measure of popularity, it would seem almost impossible to edge a new quack article into an already overstocked New England market. But the ever-craving appetite of that great multitude of unreflecting men and women, who are always ready to swallow down impositions under the potent name of medicine, is scarcely satisfied with the variety offered for their acceptance; and it is a lamentable truth, that the patent medicine disease is extending, and the cunning manufacturers of depopulating compounds are glorying in the success of their thousand and one devices to physic the nation. At this juncture of affairs in the system of wholesale humbuggery, one Gridley, of Southampton, Mass., has marched boldly into the arena with a new pill—the mightiest of all. Already, the lame, the halt and the blind, begin to cry for them, as the proprietor says of the worm lozenges—yes, they will sell, because there is magic in the idea of a *golden pill.* Then they are so perfectly safe, too, that box upon box may be taken with impunity, thus prolonging the pleasure indefinitely. Under the schedule of directions we read that "*An adult may take one of the gold pills after breakfast and another after supper, for fifty days.*" What an obvious improvement over the antiquated plan of a dose once or twice a week! In a circular addressed to physicians, one of which is before us, are the following statements: "The base of the gold pill is chloride of gold, iodine and chlorine, exalted nearly one hundred fold by galvanic forces. They are so powerfully magnetic that they generally quiet the nervous system, and in all susceptible persons, produce more or less inclination to sleep, of the most pleasant and refreshing kind. They excite the organs of generation, are a cure of sterility, arouse the system generally, permanently and safely." This quotation explains the abomination that lurks under the guise of a golden pill. Before condemning the British govern-

ment for winking at the violation of a wholesome, righteous law of China, against the habitual consumption of opium by the people, we had better look into the manner of feeding the ignorant martyrs to imaginary maladies with that seductive drug at home. If morality is not absolutely put to the blush by the insinuation in regard to the specific effects of these "golden pills" on the procreative apparatus, it is enough to make one ashamed of a state of society that tolerates these brazen-faced inroads upon decency.—*Boston Med. & Surg. Jour.*

Voluntary Loss of Muscular Action.—From the Christian Reflector we extract the annexed account of the long disuse of one the limbs of the human body. Many similar facts are on record, illustrative of physical endurance, and of the force of customs based on false views of religious duty:—

"It may seem incredible, but it is undoubtedly true, that there now exists at the Marmandilla Fank, in the middle of the city and island of Bombay, British India, a human being who has inhabited a summer-house, and held, on the palm of his left hand, a heavy flower-pot for twenty-one years without intermission. The narrator of this circumstance actually saw the hermit (for such he is called). The arm is completely sinew bound and shrivelled, the nails of his fingers are nine inches long, and curved like the talons of a bird. His beard nearly reaches to the ground when standing erect.

"While sitting, the man rests his elbow on his knee, and when walking he supports it with the other hand. His countenance indicates intelligence, and he once had very extensive possessions. All he now possesses is a few rags round the middle of his body, and a servant who is allowed to attend to his immediate wants, the pecuniary part of which is supplied by visiters.

"Twenty-one years ago he lost his caste by eating mutton! an indulgence in totally forbidden food, and was consequently condemned to hold, for 30 years, a large flower-pot filled with earth, in which grows a sacred plant. To lose caste, and not be able to take it up again, according to the superstitions of these deluded idolators, is to incur the penalty of everlasting misery in a future state. What an example does this poor deluded creature afford of perseverance, zeal, courage and devotion, worthy even of the highest cause. If he live to redeem his caste, most likely he will hereafter be set apart to be worshipped as a god."—*Ibid.*

Contractions from Burns. By Mr. Bransby Cooper.—If suppuration take place in a burn, great care must be taken to prevent contractions during and after cicatrization, for both granulations and newly-formed skin have such a tendency to shrink, that all the precautions which can be taken will sometimes prove abortive, and dreadful distortions result.

I cannot agree with Mr. Earle in considering them always as a "source of blame to surgeons," but, on the contrary, believe that they are the effects of a condition of granulations and skin peculiar to

burns, as indeed John Hunter has said:—"The contraction takes place in every point of the granulation, but principally from edge to edge, smaller and smaller, although there is little or no new skin formed, which now even has a similar power, assists the contraction of the granulations, and is generally more considerable than that of the granulations themselves; drawing the mouth of the wound together like a purse." These contractions produce the most frightful scars, and frequently interfere with the functions of important joints. I have often seen the chin drawn down upon the sternum, the lower jaw depressed so as to prevent the closing of the mouth, the saliva constantly flowing over the lips, deglutition obstructed, and all these inconveniences attended with frightful distortions of countenance. Permanent contractions of the limbs frequently result, tying the upper arm to the chest, after burns about the shoulders, so as entirely to prevent the performance of the motions of the upper extremity, rendering it often worse than useless, an actual burthen, and the inconvenience inducing the sufferer to seek any operation, even to the removal of the limb, for the cure of the deformity, rather than remain a permanent cripple. As to the operations proposed, and often performed, for the cure of the deformities arising from burns, I can say but little in their favour; and indeed so unsuccessful have they proved in my own practice, that I feel but little disposed to recommend a patient to submit to the painful dissections which are required for the removal of the cicatrices, and which so rarely afford the relief anticipated. Dupuytren, who does not speak very favourably of the result of operations on cicatrices after burns, recommends that they should never be attempted until months, or even years, after the formation of the cicatrix—not, in fact, until the "fræna and bands had become perfectly organized," when he considers they have no longer any tendency to contract. An objection to this practice appears to me to present itself—viz., that the muscles have probably undergone a change to fit themselves to the new position of the limb; and that even bones themselves, if a joint be implicated in the contraction, may have also so accommodated themselves to the circumstances in which they are placed as to be incapable of being restored to their original position, even could this be effected.

The operation usually proposed for the removal of these deformities is the transverse division of the contracted cicatrices until the parts can be drawn and extended to their natural position, and there be retained by bandages and machinery competent to the purpose. In some cases this cannot be effected at once, but must be attempted by a slow and gradual extension, which should be constantly maintained during the granulating process. When these means are employed, the apparatus should be worn for many months after the wound is healed—indeed, until the new skin has become perfectly organized, or contraction will be certain to recur as soon as the extending force is removed. Should the granulations become too exuberant during the recovery, nitrate of silver should be freely employed to keep them down. Some surgeons have recommended that the whole extent of

the cicatrized skin should be dissected off, and that the parts previously bound down should be restored as nearly as they can be to their natural position, that the edges of the healthy skin should be brought into as close an approximation as possible, and appropriate means employed to promote the healing of the wound. Modifications of this mode of treatment have been adopted by making a longitudinal incision through the healthy skin on each side of the wound, but at some distance from it, so as to enable you to bring the two portions of the skin, thus let loose as it were, in as close contact as possible. Some surgeons have even practised the Taliacotian plan of partially removing a portion of skin from the vicinity of the wound, and thus attempting to restore the burnt surface by applying it over the wound, and to unite it, by what is termed the plastic mode; but even under such circumstances, the contractions have returned with the same inveteracy as under the other modes of treatment.

I believe the great object is to prevent these contractions, during the progress of the healing of the wound, and the position of the patient is the principal preventive means, taking care that the mechanical methods are persevered in until the cicatrix is perfectly organized, and the new skin has lost all its tendency to contraction; but I acknowledge it is very difficult to say when that exact period has arrived.

About three years ago I had placed under my care a child of eight years old, who had been burnt about two years before in the front part of the neck; and in consequence of the contraction of the cicatrix, the head was drawn downwards toward the chest, the lower jaw and lip depressed, and the countenance much disfigured. I made an incision along the base of the lower jaw to the extent of the cicatrix, and dissecting the skin of the lip from the bone, restored it to its natural position. I then dissected off the whole of the cicatrix, divided the sternal attachment of the sterno-cleido mastoideus muscle on one side, and was then able to elevate the head; in which position I secured it by an apparatus, which was made for the purpose, to support the chin, and prevent subsequent retraction. The plan promised complete success for six or eight weeks, when the pressure of the chin upon the instrument, probably from contraction recurring, became so painful that its use was obliged to be discontinued. The result of this was, that, although the patient was relieved to a considerable degree, the deformity returned to a certain extent, and she left London permanently disfigured. One great advantage, however, was gained by this operation—viz., the lips were restored to perfect adaptation, and rendered capable of performing their natural functions. I have also divided cicatrices from burns in the hands producing contractions of the fingers, but with no better success. The protracted period necessary to the cure tires most persons out long before it is completed.—*Med. Gaz.*

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